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American Antiquity

A Quarterly Review of American Archaeology

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AMERICAN ANTIQUITY

VOL. IV JULY, 1938 NO. 1

EDITORIALS

NEW OFFICERS . . . We start Volume IV under the guidance of new executive officers. Of those who have served us during the past fiscal year, and who now have transferred their duties to the next official generation, it may be said to their credit that the Society has prospered and grown in numerical strength and reputation under their administration; such facts render futile editorial words of praise.

We welcome the new executives. We trust that they will find the Editorial Board of AMERICAN ANTIQUITY wholly coöperative and in active support of executive policies. We predict for the Society under their leadership a year of continued advancement and service to American archaeology.

I hereby introduce to the readers President Edgar B. Howard. We shall hear from Vice-President J. Alden Mason in a subsequent number of the journal.

W. C. M.

MAN'S ANTIQUITY IN AMERICA . . . As this publication begins its fourth year, under the able editorship of Mr. McKern, it is encouraging to note that it has made an enviable place for itself among scientific journals in this country, and is now an accepted medium for the presentation, interpretation, and discussion of problems concerned with human history in America.

Its title, AMERICAN ANTIQUITY, is a particularly appropriate one, and in it we see a challenge to all archaeologists and to scientists in related fields to discover the answer to one of our most baffling and yet interesting questions, namely, "how long has man been in the New World?". Attempts have been made for many years to find the correct answer to this question, and though we can point to some progress during recent years in the formulation of a North American chronology, largely due to the tree-ring dating of Dr. Douglass, the question still remains unanswered.

This is not to infer that the establishment of a complete chronology

for the New World is the sole objective of archaeologists. This is only one phase of the whole problem of man's early cultural development in America. An absolute chronology, in fact, may not be necessary, and is very likely impossible of attainment, but we need to fill in the gaps in our relative chronology so that we shall be able to recognize clearly our early cultural patterns. We must be able to see more distinctly than we do at present the picture as it is thrown against the background of New World prehistory.

Our literature is replete with speculation and discussion of the problem relating to man's antiquity in America. There have been, and still are, two quite extreme viewpoints on the subject—one regarding man as a comparatively recent migrant from Asia, the other carrying man back into the Pleistocene, prior to the Wisconsin stage of ice advance. Between these two extremes by far the larger body of opinion is to be found today. Through facts presented by anthropologists and paleontologists this middle-ground opinion has come to recognize some of the weak links in the chain of arguments for any very great antiquity. At the same time it has maintained a sufficiently broad-minded view to accept other facts that have been accumulating rapidly during the last ten years or so, which go to show that man is not a recent arrival but has been here for a length of time measured by thousands of years.

We are familiar with the early attempts of Abbott, Wilson, and others to establish Paleolithic man in America, and with the thorough manner in which these claims were refuted by Holmes. We are also familiar with the dampening effects of these controversies on the efforts of archaeologists and others to get at the bottom of the problem. It has been only in the last decade that renewed attempts have been made to solve this problem of chronology for the New World; and, as we have already pointed out, progress has been made. There are still extreme opinions, probably in much more of a minority than formerly; but out of all the sifting of ideas on the subject, facts are accumulating slowly to give hope that some day we can have a chronology worthy of the name.

At least we have come to the realization that the whole problem is a complex one and that it cannot be solved by any one particular branch of science, but that it will take the combined efforts of all those interested in it, no matter from what angle it is approached. It is in this noticeable trend toward coöperation that hope lies for an ultimate solution. A bit of evidence here, supplied by a geologist or paleontologist, and a bit there, offered by an anthropologist, helps to limit wild speculations on the part of some other investigator. Evidence furnished by a

botanist in working out his own theories regarding climatic changes or migration of plants may be just what is needed to help complete a small part of a picture for a glacial geologist.

Therefore, coöperation should be encouraged in every way possible. Many individuals balk at coöperation because they fear that the credit which should accrue to them personally for whatever results are attained will suffer by such a pooling of interests. It is possible, however, to effect coöperation without sacrificing any personal advantages, since this has been demonstrated many times in recent years, not only among individuals but between institutions as well, with the best results to show for it. Let geologists and paleontologists know what ethnologists anthropologists and archaeologists are doing, and *vice versa*, and not have each regard such a broad problem as the special prerogative of any one group.

In this way progress in the solution of the problem of when man first came to the New World, and what his origin was, may be accomplished before the present generation of research workers has become the dust for future archaeologists to dig up.

EDGAR B. HOWARD, *President*

A NEW DIVISION . . . With this number we introduce to our readers a new division of the journal: "Facts and Comments." Previously, matter appropriate for such a division has been arbitrarily thrust into the "Correspondence" division, where much of it was noticeably not in character with the division heading. Inasmuch as actual correspondence is arriving at the Editor's desk in increasing quantity, it seems advisable to limit copy for this division to matter conforming with its title, and this can best be done by creating a new heading for relatively short discussive and locally informative articles not contributed as correspondence.

We are not wholly satisfied with the title for this division; do not be surprised if it takes a new and startling form in subsequent issues.

W. C. M.

FUNCTION AND CONFIGURATION IN ARCHAEOLOGY[1]

JULIAN H. STEWARD[2] AND FRANK M. SETZLER[3]

CULTURAL anthropology is generally considered to be a distinctive discipline which seeks an understanding of the fundamental nature of culture and of culture change. The nature of its ultimate objectives, however, is rarely made explicit, and a lack of agreement exists concerning even the more immediate objectives. There is reason to believe that within the last few years archaeology and ethnology are, in many respects, growing rapidly apart instead of contributing to mutual problems. It seems timely, therefore, to inquire whether there really exists a general, basic problem of culture and to what extent archaeological research may be brought to bear upon it.

When materials are susceptible to arrangement in time sequences, archaeology and ethnology both aim to make historical reconstructions, the latter often depending upon the former for the depth in its cultural picture. Some ethnologists, however, now expressly deny an interest in historical reconstructions. Both disciplines seek to ascertain spatial distributions, though a reason for doing so, especially in ethnology, has frequently been to infer history. Both subjects are, to varying degrees, concerned with taxonomy, though the use to be made of taxonomy is not always evident. Some ethnology has recently emphasized functional studies, which, however, usually stress kinship and rarely embrace total cultures. Archaeology has generally avoided treating data in functional terms. And, finally, much ethnology is treating culture in psychological terms. One searches with difficulty for the common problems which coordinate the research in these two branches of cultural anthropology.

What can be said of the objectives of archaeology? There are several immediate aims which seem beyond question. Though individuals have somewhat different interests and though areas present

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[1] "Configuration" herein has its common meaning of design or form in which elements of a culture are arranged and interrelated. In ethnology, "pattern" has been used in this sense for many years. It is unfortunate for clear terminology that in the system of archaeological classification adopted for the Mississippi Valley, "pattern" was chosen to designate a complex of elements of a certain magnitude, thus giving it a totally different meaning in archaeology and ethnology.

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different kinds of problems, all archaeology deals with relatively tangible and concrete objects and their significant associations. Each object is a culture element. It is first treated individually, being named and assigned to a broad class of objects, such as pottery, projectile points, and the like. This kind of taxonomy is similar to that in biology. But culture elements rarely occur in isolation. Instead, certain of them are usually found together again and again in greater than chance association. They are usually part of complexes. Another task common to all archaeology, therefore, appears to be the identification and naming of complexes. Such complexes are similar to the biologist's floristic and faunistic assemblages.

Archaeology is also concerned with the historical arrangement of culture elements. Without reference to time and space, mere classification of elements and complexes has little meaning. Moreover, it is one of the striking characteristics of culture complexes that their contents usually do not remain unaltered in all places and in all periods. A description of the changes which they undergo is history in the narrow sense or, we may say, the raw materials of history. To many persons history is so much a part of archaeology that it may seem absurd to underline its importance. But there are some who believe differently.

When complexes have been identified and history in the narrow sense reconstructed, what task remains for archaeology? Some day world culture history will be known as far as archaeological materials and human intelligence permit. Every possible element of culture will have been placed in time and space. The invention, diffusion, mutation, and association of elements will have been determined. When taxonomy and history are thus complete, shall we cease our labors and hope that the future Darwin of Anthropology will interpret the great historical scheme that will have been erected? There has been a marked tendency to avoid these questions on the assumption that they are unimportant at present. It is held that the urgent need of the moment is to record data which are rapidly vanishing, provided it is done with proper techniques.

We believe that it is unfortunate for several reasons that attempts to state broad objectives which are basic to all cultural anthropology and to interpret data in terms of them should be relegated to a future time of greater leisure and fullness of data. First, although technological advancement is of the utmost importance, techniques alone neither state nor solve problems. Techniques are tools. It is difficult to believe that any tool can be developed to perfection without a definite concep-

tion of the purpose for which it is designed. It is, in fact, very probable that techniques for collecting facts which now seem important actually fail to procure other and equally important facts. Techniques, therefore, may be perfected only with reference to their purpose, which involves the question of research objectives. Second, no one will in the future be able to interpret data one tenth as well as the persons now immersed in them. The increasing variety and volume of accumulated facts and the minutiae of element variations and associations in an area even moderately well known archaeologically are forbidding to the non-specialist. It is only to the extent that archaeological findings are interpreted in terms of broad problems that they are useful to the general student of culture.

One wonders whether the frequent limitation of interest to measurements and tabulation of data and refinements of techniques is an unwillingness to grapple with the problem of objectives. Perhaps the fascination of immediate materials, such as pots, celts, and other choice objects which first drew interest to archaeology continues to some extent to obscure the matter of their broadest significance. Candid introspection might suggest that our motivation is more akin to that of the collector than we should like to admit.

The intense interest in specimens *per se* is betrayed in many archaeological monographs, including those of the authors. We treat materials primarily as items to be described, listed, and arranged historically, but not as devices employed by human beings in important daily activities. This is implied in the use of such descriptive headings as objects of "bone," "horn," "stone," and others based upon materials, instead of such functional headings as "horticulture," "food preparation," "hunting," "fishing," "dress," "adornments," "household," and others appropriate to the culture.[4]

Do we avoid present efforts to interpret data because they have intrinsic qualities which forbid it? Is it inherently logical to postpone it; or has chance oriented our interest in other directions? We incline to the last explanation. Candor would seem to compel the admission that archaeology could be made much more pertinent to general cultural studies if we paused to take stock of its possibilities. Surely it can shed some light not only on the chronological and spatial arrangements and

[4] A tentative effort to use more meaningful categories was made by Barrett, "Aztalan," 1933; Deuel, "Pictorial Survey" 1935; and by Cole and Deuel in "Rediscovering Illinois," 1937. Linton, "The Study of Man," 1936, pp. 394–396, has suggested classifying data under "biological," "social," and "psychological needs."

associations of elements, but on conditions underlying their origin, development, diffusion, acceptance, and interaction with one another. These are problems of cultural process, problems that archaeology and ethnology should have in common. And it is by no means improbable that in spite of our refined techniques of excavation, ceramic studies, and classification, we are actually overlooking important data, even when doing field work, that would contribute to their solution.

We would like to suggest, therefore, a few points at which archaeology may touch the broader and more basic cultural problems, hoping that if we have ventured into the realm of controversy, it may at least elicit other points that have not occurred to us.

First, considerable enlightenment would be provided the general reader of archaeological monographs if more information were provided about the general features of a culture. Often ten pages are devoted to the minutiae of pottery temper, paste, and so on, while one page or less describes subsistence and the relationship of the culture to the geographical environment. Such disproportionate treatment of different subjects is by no means always explainable by lack of information about the latter. Even less space is usually accorded data concerning social groups and population distribution and concentration which are indicated by such elements as house remains and village locations.[5] Even when these data are included in a monograph that seems monumental in its detailed completeness, it is often exceedingly difficult to extract them.

Any culture must, of course, rest upon a basic economy which is adapted to its environment. This adaptation is human ecology. To varying degrees, it produces a configuration that interrelates a large number of elements; e.g., food getting, storing, grinding, and cooking. A description of it would, so far as data permit, make explicit the relative importance and kind of horticulture, fishing, or hunting and gathering; the relation of these traits to soils, altitudes, rainfall, flora, and fauna, that is, to the natural landscape. It would ascertain whether particular types of economy did or did not correlate with certain environments, and whether unlike economies occurred in the same

[5] Steward, in Ecological Aspects of Southwestern Society, Anthropos, Vol. 32, pp. 87–104, 1937, endeavored to synthesize archaeological and ethnological data on population and social groups. In spite of the great amount of archaeological work that has been done in the Southwest, it was, except from a few reports, extraordinarily difficult to extract data on the types and distribution of prehistoric villages.

environment. It would also make explicit the kind of villages, evidence of clustering or lack of clustering of houses, number and distribution of villages in an area, and inferences about population density and stability. Such data would have enormous value to an anthropologist, economist, or geographer seeking historical depth in the conditions of population groupings underlying social and political configurations.

It is true, of course, that many areas yield only cemeteries, ceremonial structures, or other limited types of antiquities. It may be sometimes suspected, however, that if the more conspicuous and exciting remains held less intrinsic interest, a more deliberate search would be made for evidence of villages, subsistence, and other features to complete the cultural picture. Surveys to establish the distribution of recognized complexes are, of course, indispensable. But only complete and detailed excavation which is interpreted in the fullest possible degree will afford data pertinent to problems of culture process.

We believe also that treatment of archaeological objects would be more meaningful if they were regarded not simply as museum specimens but as tools employed by human beings in some pattern of behavior. This requires a deliberate effort to understand their functional[6] place in the total configuration of activity. Naturally, it is more difficult in archaeology than in ethnology to ascertain the function of each implement. The purpose of some we cannot know at all; others may be known only imperfectly. Nevertheless, each had some function. And it is not enough to ascertain, let us say, that a basket was used for gathering or a mortar for grinding. Gathering of wild seeds may have been the sole subsistence, having a basic importance and entailing not only basketry but a whole series of interrelated traits to which basketry was indispensable. Or gathering may have been a minor supplement to horticulture, so that baskets used in gathering were relegated to an unimportant place. Mortars may have been the most efficient implements for grinding the particular species of seeds used by a group, so that the use of mortars rested upon a degree of functional necessity. Or, they may have been no more serviceable than metates, so that their presence is explainable largely as historical accident.

In some areas, definable configurations and functional relationships between certain elements are so obvious as to have compelled recogni-

[6] "Functionalism," unfortunately, carries a somewhat formidable connotation to many anthropologists. The word has been publicized in connection with analyses of a very narrow segment of culture, namely, kinship systems. It is nevertheless a very useful concept.

tion. For example, in Middle America and the Southwest there was a more or less closely knit complex of elements clustering around intensive horticulture. It comprised large communities, ambitious and permanent habitations, and an elaboration of society, ritual, and ceramic, textile, and other industries. Descriptions of these cultures, consequently, involve more than mere element lists or enumerations of the elements of complexes; they inevitably make more or less explicit the general cultural patterns and the functional position of the elements in those patterns.

It surely cannot be assumed that the culture elements of other areas were not also interrelated in some definable configurations. Yet many monographs merely list elements found in a site as if their sole connection were chance association. The manner in which elements were connected with one another is, of course, no more evident from a mere list of them than the design or pattern of a tile mosaic is evident from a list of the shapes, colors, and numbers of tiles composing it.

Though we stress the importance of seeking configurations, we do not imply that all elements are equally integrated in any culture. The functional place of arrowpoints, basketry, grinding implements, and pipes, for example, may be very dissimilar. Some may have had basic importance, while others were dispensable or variable. Any element, moreover, may have played a very different role in a horticultural, a hunting and gathering, or a fishing culture. Archaeology no less than ethnology can gain some insight concerning the functional place of elements in cultures. This knowledge may not only contribute to an understanding of culture process, but may even modify historic and taxonomic conclusions.

The last point may be illustrated with mortuary customs. It has been asked whether mortuary customs are an index to culture. This is really a question of their functional role in the configuration of each particular culture, that is, of their relative susceptibility to change. It may be answered only empirically. Data of ethnology, supplemented by documented records, show that among certain far western tribes mortuary customs have changed with great rapidity. Some tribes substituted burial for cremation because they moved away from an area of sufficient fire wood or because they came into contact with tribes which buried. Some shifted from burial to cremation for similar reasons, while others practised either, depending upon circumstances at the time of a death. Though archaeology cannot give so precise a statement as ethnology of the functional place of mortuary customs in any culture,

its historical sequences usually enable it to give a better statement of the stability of these customs relative to the total culture. If changes in mortuary customs are concomitant with changes in certain other practises, it may be inferred that their functional connection is great; if not, the connection must have been slight. In either event, the value of mortuary customs as an index of culture change cannot be determined *a priori*.

We criticize not commissions but omissions in modern archaeology. Though modern field techniques, intensive ceramic studies, listing of elements, and taxonomic methodologies serve important purposes, it is unfortunate that emphasis on them alone should be at the expense of clarifying the general problems. Though the conception of ultimate objectives will develop as the science of archaeology matures, we believe that a deliberate effort should be made at present to ascertain whether or not our daily research is likely to fit into a general scheme of cultural research. Otherwise, the fruits of archaeology will continue to have little apparent bearing on other fields of cultural research and to hold little interest for persons other than antiquarians.

EXCAVATIONS AT KINISHBA PUEBLO, ARIZONA

GORDON C. BALDWIN[7]

THE group of ruins comprising the prehistoric pueblo of Kinishba is situated in a broad valley about four miles northwest of the town of Fort Apache, Arizona, on the White River Apache Indian Reservation. Kinishba, the Apache name for this pueblo meaning "Brown House," is derived from the color of the rock walls of the ruin. The valley is bounded on all sides by high plateaus and mesas, with the White River cutting across from east to west at the southern end. The valley floor is thickly covered with grass, cholla, and juniper, while the surrounding hills support a fairly heavy stand of pine, pinyon, and juniper.

Kinishba is located in the area drained by the White River, one of the two principal branches of the Salt River, and therefore is definitely placed in the Upper Salt drainage or culture area. However, the Mogollon Rim, the southern boundary of the Little Colorado area, rises only twenty miles to the north, and Kinishba actually occupies a peripheral position between these two major culture areas. Thus the excavation of this pueblo was undertaken with the hope of solving some of the problems of relationship between these regions.

The Upper Salt area has never received the amount of investigation that other sections of the Southwest have had since the days of Spanish discovery, and there is no mention of this particular pueblo until Bandelier came through the area in April, 1883. He gives the following account of the ruin:

"It stands on both sides of a deep ravine, in the bed of which pines are growing . . . The village appears to be a compact small-house settlement, and there are, outside of each of the two groups, scattered smaller buildings. The wide valley in which the ruins are situated is without water for irrigation, and I did not observe any provision made for storage, nor did I notice estufas."[8]

In the early years of the present century, Dr. Hough conducted a survey of the Gila-Salt area, and made the following brief note about the pueblo:

"About 4 miles northwest of Fort Apache, near the foot of Sawtooth Moun-

[7] Assistant Director, Arizona State Museum, Tucson, Arizona.

[8] Bandelier, A. F., Final Report of Investigations Among the Indians of the Southwestern United States; Part 2. Papers of the Archaeological Institute of America, Amer. Ser. 4, Cambridge, 1892.

tain, is a very large pueblo situated on both sides of a ravine, in the bottom of which pines are growing. The location is about 2½ miles north of White Mountain Creek. Much excavation has been carried on here, but not systematically."[9]

Undoubtedly much of this early excavation was done by soldiers from the nearby fort, and since that time there has been some pothunting by others, but not to any great extent. Several archaeologists make brief mention of this pueblo, but only with regard to survey work. In the summer of 1930, Dr. Byron Cummings of the University of Arizona was informed of the existence and evident importance of this group of ruins, and after a preliminary survey of the pueblo in the spring of 1931, he began excavation in the summer of that same year. The work has been carried on every summer since then by the Department of Archaeology of the University of Arizona and the Arizona State Museum under the direction of Dr. Cummings.

The ruin is composed of eight groups, the two largest of which are situated on opposite sides of a rather broad and deep wash. The question of whether this ravine was in existence when the pueblo was occupied, or whether it has been eroded since then, is still not definitely known, but it seems quite likely that there was a spring located at the north end of the groups and flowing south between them, forming a shallow depression. It is clearly shown that the ravine was not as wide then as it now is, because many of the inner tiers of rooms bordering the wash have been almost entirely washed away. It is therefore impossible to estimate how far the rooms extended in that direction, and whether the two groups were ever joined to form one large compact pueblo.

The large group bordering the eastern side of the wash was designated as Group I. It is compact and rectangular in form, the three sides that are intact showing rather straight walls. The total length north and south is 336 feet and the maximum width of the portion remaining is 113 feet. The plan of this group is rather simple, consisting of the rectangular block of rooms with a large patio towards the southern end and a secondary patio to the north. There are two entrances: one in the southern and one in the western wall.

Group II, the section on the west bank of the ravine, is larger, less compact, and presents a more complicated ground plan. Its length north and south is 443 feet and the maximum width is 159 feet. From

[9] Hough, W., Antiquities of the Upper Gila and Salt River Valleys in Arizona and New Mexico. Bulletin 35, Bureau of American Ethnology, p. 81, Washington, 1907.

surface indications there would appear to be over 200 ground floor rooms in Group II, a somewhat greater number than in Group I.

The remaining six groups are much smaller than the first two and cluster closely about them, three on one side of the wash and three on the opposite side. No excavation has been done on any of these smaller groups and, consequently, very little can be said as to their probable connection with the main sections; but from the surface collections of sherds made on each of them, and from their location with regard to the larger groups, it seems evident that all eight of the groups were occupied contemporaneously. A short distance from these, however, are several small house groups which show occupation just prior to that of the main pueblo.

During the seven seasons work at Kinishba, about 140 rooms were uncovered in Group I, and ten in Group II. The refuse mound southwest of the latter group was thoroughly explored for burials, and other burials were excavated north of Group IV along the wash. Also about seventy rooms, including five second-story rooms, were rebuilt in the southern section of Group I. Eventually it is hoped to complete the excavation of Group I and to restore the southern half of it.

ARCHITECTURAL FEATURES

All of the rooms excavated were ground floor rooms, no second-story rooms remaining in place. But there was sufficient evidence to show that practically the entire pueblo had been at least two stories in height, with a possibility of three in several sections. A majority of the rooms uncovered seem to have been living rooms, as most of them contain fireplaces, mealing bins, and household artifacts. These rooms are usually rather large, averaging about ten by thirteen or fourteen feet. There were only a few small storage rooms found, although some of those designated as living chambers might easily have been store rooms, as the distinctions between them are often rather faint.

True kivas, as the circular subterranean ceremonial structures of the north, have not yet been found at Kinishba. But there are a number of rooms that seem to present some of the features of the kiva. The first of these was located in the secondary patio north of the main courtyard. This room was subterranean, the floor being five feet six inches below ground level, but rectangular in shape rather than circular as the true kiva. It measured ten by eleven feet, with a small chamber at the south end two feet nine inches wide and running the width of the main room. The floor level of this antechamber was two feet four inches

higher than that of the main part, and it was set off by a wall with a doorway in the center reached by a single step. The walls of this sunken room were interesting and varied, the north consisting of plaster on the natural dirt with five supporting posts held in place by small stones and clay, the south of masonry with seven support posts set in, the east of masonry with ten posts, two of which were placed together in the center of the wall, and the west wall of masonry with a poorly constructed column in the center. The two posts in the east wall and the column in the west undoubtedly held the major roof beam. A small rectangular firepit of stone slabs was located near the center of the room, with a shallow depression to the north that may have been the ladder rest. A round flat stone was embedded in the floor next to the south wall. The very few artifacts found in this room were largely ceremonial in nature. From its subterranean nature and from the presence of the antechamber to the south, which may represent a prototype of the raised platform of the Old Hopi kiva, there is little doubt that this room was ceremonial.

Room 27 in Group I exemplifies what may be considered a second type of ceremonial room. This room fronted on the main courtyard on the western side, measuring twelve feet eleven inches east and west and fourteen feet ten inches north and south. There was a square fireplace in the center and directly east of it, about midway between the firepit and the east wall of the room, was a large rectangular slab of sandstone set on edge in the clay floor, corresponding to the deflector or altar stone found in true kivas. In the east wall, in line with the fireplace and the upright stone, there was a small, almost square opening through the wall, the bottom being four inches above floor level. This shaft led through the wall to the east side where it opened into a horizontal shaft lined with large rocks, and with what seemed to have been a pole and clay roof. This horizontal shaft lay just beneath the top of the bench surrounding the patio and apparently led through it to the court in the side of the bench. Along the south wall of the room ran a banquette or bench of rocks and clay, very thickly plastered, measuring one foot ten inches high and one foot one inch thick. A second room nearby also had the shaft through the wall, but lacked the other kiva-like features.

The masonry in these rooms was quite varied, hardly any two rooms showing the same wall pattern. This was due to the fact that there were at least three different types of wall construction, rubble, cyclopean, and ashlar. The best type was the ashlar or coursed masonry consisting

of large, rather even rocks laid in regular courses, usually alternating with thin layers of shale and sandstone (Plate 1, Figure 1). The larger rocks were of more or less uniform size, and were always faced on at least one side. These were more often limestone boulders, although some sandstone and granite was used, while the thinner courses were of slabs of sandstone or shale. There was not a great deal of clay used in this type of wall, the thin sheets of stone being used as chinking and taking its place to a great extent.

The second type of masonry was the cyclopean. This consisted of large and small rocks, often irregular in shape, laid in uneven courses. The blocks of stone lack the smooth and regular surfaces of those of the ashlar type, and the courses are inconsistent. The thin sheets of shale and sandstone were seldom used in this type, clay mortar having been substituted.

The third and poorest type was the rubble masonry. It was made up of small rocks and boulders, very irregular in shape, laid up in an abundance of clay mortar. There was no attempt at coursing and the finished wall presented an uneven aspect, much more so than the cyclopean wall. This type was almost invariably plastered with a thick coating of clay, and quite frequently the other two types were also.

In the use of these three types there seemed to have been no set plan that the builders followed. It might be thought that they represented three different building periods in the development of the pueblo, but there was no evidence for this, since the three types occur in all sections of the pueblo and occasionally even in the same room. The only regularity in construction was in outside walls exposed to the weather, where large regular blocks of stone in even courses formed the only type of masonry. This was probably due to the relative weakness of the other two types. That these people recognized this fact may be seen in the occurrence of these types. In a majority of cases, if there was a rubble type on one side of a wall, the other side was an ashlar wall. In almost as many cases the cyclopean type was used as a backing for the ashlar type, and only two or three walls combined two cyclopean types in a single wall. In not one instance were two rubble walls placed back to back to form a single wall. This shows that the cyclopean and rubble types may be considered as veneers for the ashlar or coursed wall.

No roofs were found in place in the pueblo owing to its exposed nature, but sufficient evidence was found in decayed and charred timbers, burnt clay with roof impressions, and post holes, to permit an estimation of the probable construction. The number of beams seemed

to vary from one to three, evidently depending largely upon individual taste rather than upon the size of the room. At right angles upon these were placed smaller poles a few inches apart, with brush or split logs over them and a three- to four-inch layer of clay on top.

The floors of the rooms were normally of hard-packed clay, with the exception of the northwest corner of Room 26, which was paved with flat slabs of stone.

Entrance to these rooms in the majority of cases was by means of a ladder and trap-door in the roof. This was the usual form of entrance in most open pueblos, however, as it rendered the village more impregnable in time of invasion, the usual procedure being to gain access to the roof by means of a ladder, which could be pulled up in case of danger. In some rooms there were found either one or two shallow pits, generally near the fireplace, which probably marked the site of a single or double pole ladder. In one room there was an elaborate ladder rest consisting of a raised clay platform on one side of the fireplace, with flat slabs of stone lining the back part of the platform where the ends of the ladder rested.

Of the few lateral or side doorways that were found, none opened out from the rooms to the exterior of the pueblo, with the exception of several entrances from patios or courtyards. These side entrances usually measured about sixteen inches in width and twenty-seven inches in height, with the sill about twenty inches above floor level. The sill consisted of a single flat stone and the lintel above was formed of another flat stone, with probably several flat cedar strips beneath it to act as supports. Beside one of the doorways was found a flat sandstone slab nineteen inches wide and twenty-five inches long which evidently served as a doorstone. An abandoned, filled-in doorway is shown in Plate 1, Figure 1.

Fireplaces were found in almost every room excavated, in every case at or near the center of the room. They were usually square or rectangular in form, fourteen to eighteen inches on a side, and constructed of flat slabs of rock set on edge, forming a box-like structure. Sometimes these slabs were sunk in the floor of the room so that the top was level with the floor, although frequently they might be raised eight to twelve inches above the floor, the slabs of rock being held in place by hard-packed clay. A second type was clay-lined, either circular or oval in shape, and was below floor level.

Only two mealing bins were found in place in the rooms, but from the vast amount of manos and metates discovered, there were un-

FIG. 1—Wall construction and filled-in doorway.

FIG. 2—Northwest corner of patio, Group I.

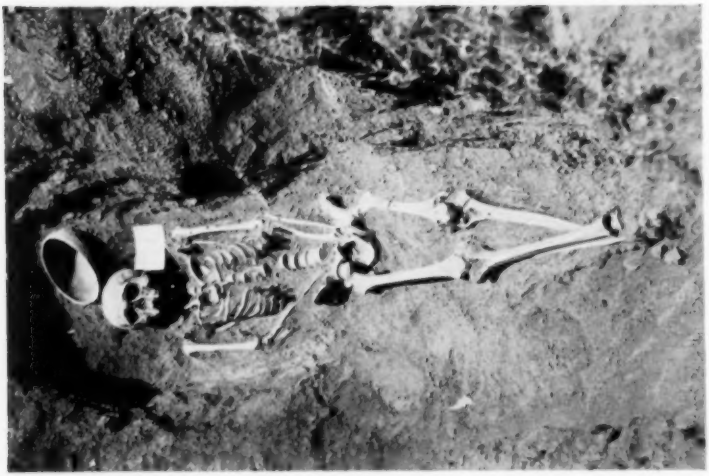

FIG. 2—Extended burial.

FIG. 1—Flexed burial.

doubtedly many more of them. A number were found either in second-story rooms or on the roofs of the houses, as most of the metates came from the room fill. The two in place were near the corners of rooms, one side of the bin being formed by the wall of the room. One of them contained a single malapai metate with flat stone slabs for side walls; the other, two metates side by side, one of coarse malapai, the second of fine granite.

PATIOS

Patios or courtyards are usual features in most large mesa or valley pueblos, the rooms generally being grouped about this common center. At Kinishba four have been located, two in Group I near the southern end, and two in Group II, one near the southern part and a second at the northern end of the group. The two in Group I have been completely excavated and present several interesting features.

The larger of the two was roughly square in form, measuring approximately 55 by 60 feet. It was surrounded on three sides by tiers of rooms and on the fourth or north side by the secondary patio, which was set off from it by a five-foot wall with a narrow doorway in the center. The floor of the patio was on the same level as that of the neighboring rooms and was made of hard-packed clay. The bench or banquette surrounding the patio was made of earth and clay, with a facing of stone along the outer edge (Plate 1, Figure 2) varying in width from three feet at the northern end to three feet eleven inches on the eastern side, with an average height of one foot eight inches.

It was thought that there might be a sunken chamber within this patio, but none has so far been discovered. However, one rather unusual stone structure was uncovered. This was a stone platform that appeared to have been some form of an altar or ceremonial platform. It was situated in the southern part of the patio, almost directly in front of a doorway leading into Room 55 to the south. This platform was of stone laid up in more or less regular courses. It stood with its long axis east and west, and measured eight feet by four feet by two feet.

There is a possibility that a portion of this patio was once covered by a roof. Around the edge of the bench were found the remains of a number of juniper posts (Plate 1, Figure 2). These were spaced at more or less regular intervals and may have supported a flat roof extending at least to the edge of the bench.

The main entrance was to the south through Room 55, which seems to have been an antechamber to the patio. There were no fireplaces or

other living features within the room. A large doorway four feet four inches wide led into the patio, with the remains of a post on either side. In the south wall was a second doorway seven feet six inches wide running due south to the exterior of the pueblo. This long passageway was covered by second-story rooms as was shown by the walls that had fallen at an angle across it.

The secondary patio, just to the north of the main one, was much smaller, measuring approximately thirty-nine by twenty-seven feet, with no encircling bench, but two small alcoves, respectively on the east and north sides. In the west wall a passageway five feet six inches wide led to the edge of the wash. Several sets of posts on the sides of this entrance indicated it was roofed over. The sunken chamber previously described was located about in the center of this patio.

BURIALS

The people of Kinishba as a rule buried their dead in the refuse mounds surrounding the pueblo. Inhumation was almost the only form employed, but three cremations were found. Three refuse mounds yielded seventy-six burials, chiefly adults. A great many burials, however, were found in the pueblo, either in abandoned rooms or beneath the floors of occupied rooms. Excepting one or two adult skeletons, these were all of children.

The usual position was extended on the back (Plate 2, Figure 2). Only five were found fully flexed, and eight partially flexed. The body ordinarily lay on its back, with arms and legs extended, and the hands at the sides. In several instances the lower limbs were crossed at the ankles, and in one or two others either the right or left hand or both rested on the pelvis. In the flexed burials the body was placed either on its face or on the side with the knees drawn up and the arms folded up to the face (Plate 2, Figure 1). There was a definite attempt at orientation, the head commonly being to the east with the face up.

The grave itself consisted of a long narrow trench dug in the refuse mound. The depth varied from twelve to eighty-four inches, the latter burial being intrusive into undisturbed soil. The average depth was about forty inches. Only two of the graves had a protective covering of rock: the first had two large boulders placed over the body, one over the chest and the other over the pelvis; the second, a row of ten large stones above and slightly to one side of the body, with six smaller stones projecting out over the body.

Offerings were placed in slightly more than half of the graves, con-

sisting usually of pottery, although ornaments: necklaces, pendants, and beads were frequently associated with the graves of children. The pottery was placed near the head or close to the body on either side. In only six instances were the offerings of pottery placed at the feet.

Two of the three cremations occurred in a burial mound in a refuse heap, and one in the area immediately to the east of Group I. The latter consisted of a clay-lined pit with a hard clay floor on which were fragments of burned bones, including parts of the mandible, skull, and teeth. The pit was three feet nine inches by two feet, and seven and one-half inches deep; the top was fourteen inches below the present surface. There was no west side to the pit, but a large flat stone lying there may have formed that wall. One cremation in the burial ground north of the pueblo was of this same type, consisting of a small square pit with hard-packed clay sides, within which were a great many burned bones of a small child. This pit type of cremation is characteristic of the Hohokam people in the Gila Basin, being in use until the end of the Sedentary Period, about 1100 A.D.

The last cremation resembled more closely those of the Classic Hohokam, from 1100 to 1400 A.D. The burned bones had been placed in a small corrugated olla, with two small plain bowls nearby as offerings. A few black and white beads were found scattered around the olla and bowls. The top of the olla was only six inches below ground level. About two feet east of the olla and twenty-five inches below the surface was a small shallow pit of burned clay, with ash and small pieces of burned bone in it. Beads similar to those found near the olla were mixed with the debris in the pit. This seems to suggest that cremations were made in this pit, and only a portion of the bones were placed in the olla. There were a number of burned bones scattered over the surface of the ground, probably representing other cremations disturbed by pot-hunters.

The skeletal material found at this pueblo was in a poor state of preservation. Several features, however, were noted in a preliminary study of the material. The crania were brachycephalic, with marked occipital deformation. The cephalic index, owing to this factor, ranged quite high, the average for eight males and five females on which measurements have so far been taken being respectively 92.38 and 86.4. Shovel-shaped incisors were encountered in about 25 percent of the cases where teeth were present. A number of individuals showed traces of pathologic conditions, including persons who had suffered from Paget's disease, arthritis, and possibly Pott's disease.

AGE OF THE PUEBLO

The period of Southwestern prehistory during which this pueblo flourished can be determined fairly accurately from a study of the ruin itself, its architectural features, the pottery, and stone and bone implements. According to these records, Kinishba was at its height during the latter part of the Great Pueblo Period (Pueblo III), from about 1000 to 1300 A.D., but it has been more definitely placed by means of the tree-ring evidence obtained from fragments of burned timbers from the various rooms.

Dendrochronology, or tree-ring dating, was developed a number of years ago by Dr. A. E. Douglass of the University of Arizona.[10] A good deal of material was gathered during the first summer by Dr. Florence Hawley, chiefly from Group I, Room 1, and, under the supervision of Dr. Douglass, she obtained a series of dates ranging from 1260 to 1316 A.D. The following two summers the writer collected many more beam specimens and succeeded in securing several additional dates from Group I. Room 28 gave dates of 1238 ± 5 and 1240 ± 4. Room 30 gave a single date of 1286 ± 20, while Room 44 gave dates ranging from 1285 to 1306 ± 5.[11] These rooms are rather widely scattered over the southern portion of Group I and give at least an approximation of the building dates for that section. Recently an additional date of 1161 has been secured from the central portion of the pueblo. Thus Group I was inhabited at least from 1161 to 1316 A.D.

CONCLUSIONS

In summarizing the facts resulting from a study of this pueblo, it is seen that the pueblo exhibits a number of interesting characters. The two types of kivas or ceremonial rooms seem to indicate connections with the early Hopi culture to the north, particularly due to their rectangular form and by the presence of the southern antechamber and bench. In some respects the wall construction shows similarities to that of the pueblos in Chaco Canyon and in the Little Colorado area to the east and north. The burials show a mixture of both Anasazi and Hohokam influence, although the latter force is very slight.

From the tree-ring dates it is evident that the pueblo was occupied approximately from 1160 to 1320 A.D. However, from the late pottery

[10] Douglass, A. E., The Secret of the Southwest Solved by Talkative Tree Rings. National Geographic Magazine, Vol. 56, No. 6, pp. 737–770, Washington, 1929.

[11] Baldwin, Gordon C., Dates from Kinishba Pueblo, Tree Ring Bulletin, Vol. 1, No. 4, p. 30, Flagstaff, 1935.

types, as Four Mile and Gila Polychrome, occurring extensively throughout the pueblo, it no doubt continued in existence until the close of the 14th century. Just why this pueblo was abandoned can only be conjectured. It may have been due to pressure from incoming nomadic tribes, as the Apache, driving the people north into the Hopi and Zuni areas; or a more logical explanation relates to water supply: the cutting down of the wash has so lowered the water table that water can now be secured only by means of a twelve-foot well in the bottom of the arroyo; the gradual drying up of the spring which furnished their water would ultimately have forced the people to migrate to a new location.

A METHOD OF NOTATION FOR THE DESCRIPTION AND COMPARISON OF SOUTHWESTERN POTTERY SHERDS BY FORMULA

JOHN GILLIN[12]

The attention given to the details of pottery description has of recent years absorbed so much of the interest of specialists in Southwestern archaeology that to the outsider it often appears an unduly exaggerated, if amusing, preoccupation which consumes a great deal more time and effort than it deserves. To those who have tried to work in the area, however, it is not necessary to point out the importance which this relatively imperishable trait holds. This is especially true in the case of exploration of new areas by means of surface survey, where broken pieces of pottery make up the larger part of the diagnostic material available, and in the excavation of the less well-preserved sites, especially in the peripheral areas. In the latter case, not only are many of the non-ceramic artifacts less numerous and less well preserved than in the "classical" areas, but also the pottery itself tends to show less regularity and conformity to the classical norms and sequences than in those focal regions where, so far as we now know, the development of prehistoric culture was more regular and longer continued. In such situations, if not in all, it is highly desirable to have a system whereby the principal characteristics of a ware, as determined from its sherds, may be summarized briefly and in a form which lends itself to ready and accurate comparison with other wares published or unpublished. This is especially desirable in the case of field workers who wish to compare wares which they have recovered with wares previously reported, but which they have been unable to examine personally.

In any science, nomenclature and classification are necessary as data accumulate. The Pecos Conference of 1929 (Gladwin, 1930) arrived at a basis for a systematic nomenclature for the wares of the Southwest, and some notable work has been done in pottery classification on this foundation (Hargrave, 1932; Hawley, 1936; *et al*). But an accurate and compressed system of notation, while not absolutely necessary, is also a great convenience in science, even in its descriptive phases. The system of notation herewith presented is given for what it may be worth. While it is particularly applicable to the sherds of the Southwest, the

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logic of the method, of course, is applicable to pottery of any area.[13]

Guthe (1927) has stated succinctly the minimal diagnostic characteristics which should be obtained from a non-microscopic examination of pottery. In the case of scattered sherds, we have pieces of pottery which cannot be restored to its original shape. Therefore, we are interested in the follow characteristics: paste (color, temper, texture, firing); treatment of interior surface; treatment of exterior surface; treatment of lips; treatment of rims. Other characteristics, such as chemical composition of the paint, microscopic examination of the paste, and vessel shapes, are important, but in the present state of our knowledge, not necessary for the determination of type. Chemical characteristics and microscopic analysis require special equipment and a prolonged period of study; shape restoration from sherds is at best a speculation. It is possible, for instance, to determine with accuracy the size and other characteristics of a bone from examination of a fragment, but the form of pottery, being the result of interplay between the human "mind," hands, and the principles of physics, is not governed by so regular and well-known a set of principles as those of osteology. Therefore, these characteristics can be ignored for the present.

The problem in sherd comparison, therefore, is to compress the principal diagnostic traits of a broken piece of pottery into a formula which may be readily compared with the formulae of other sherds. Given the characteristics which we wish described, the making of a formula is simply a matter of choosing symbols for these characteristics which will not be too confusing nor too protracted in length. One method would be to use a separate symbol for every conceivable combination of traits in sherds to be examined. This, however, would require the memorization of hundreds of symbols. Consequently the present plan has been to reduce the number of symbols to a minimum and to use them in combinations together with the principle of position. Another consideration is the type of symbol to be used. Abstract symbols, such as letters, figures, and numbers, require extra mental effort in their use. There should be some suggestive connection between the symbol and the trait which it represents. Furthermore, the ordinary typewriter does not possess a sufficient number of type faces and figures to supply abstract symbols without confusion. Therefore, it was decided that each

[13] The author's first-hand acquaintance with Southwestern ceramics has been obtained from museum work and two summer field trips in connection with a full-time teaching load during two years at the University of Utah. He embarks on the present discussion of ceramic problems with due humility and trepidation.

symbol be composed of two letters; in most cases these are the first two letters of the word for the trait which is being described; in all cases the symbol contains two suggestive letters from the trait word. A final consideration is that the formula should be brief enough to be expressed in a single line on a sheet of convenient size so that it may be compared with other formulae by superposition. Following is an alphabetic list of the symbols used. These may be classified into: (1) symbols referring particularly to paste; (2) symbols referring particularly to surface; (3) symbols referring particularly to design of decorative elements; (4) color symbols; (5) quality symbols; (6) symbols referring particularly to walls; (7) symbols referring to lips and rims, respectively. In order to save space, however, this classification is left to the reader.

ALPHABETICAL LIST OF POTTERY DESCRIPTION SYMBOLS

ap applied decoration
ao all-over
bi bright
bk brick (color)
bl black
bn burnished, or polished (surface)
br brown
bs basketry impressions
bt blunt
bu buff
ci circles, or curvilinear design
co1 corrugations or coils, very large (less than 1 per centimeter)
co2 corrugations or coils, large (1–2 per centimeter)
co3 corrugations or coils, medium (2–4 per centimeter)
co4 corrugations or coils, small (4–6 per centimeter)
co5 corrugations or coils, very small (7 or more per centimeter)
cm cream (color)
cr crosses
dh deep, or high
di diagonal
dm diamonds (decorative elements)
do dots (in painted work); nobbins or buttons (in raised relief); round depressions (in depressed relief)
du dull
fc firing clouds
fi finger nail
fl floated
fr firing
gl glaze

gr gray
ho horizontal
id indented
is incised
le lip everted
li lip inverted
ln line or lines
ls lip straight or direct
mi mica
mn mineral
na naturalistic
nk neck only
or orange
ov oval
P paste
pa painted
pe perforated, or punched
pi pinched
po pointed (referring to instrument)
pu purple
py polychrome
rb rim bevelled
rd red
rf fugitive red
ro rounded
rr rim rounded
rs rim square
sa shallow, or low
se series
sh herd temper
sl slip
sm smoothed
sn singly
sp spiral
sq squares
st striations
th shumb or finger markings
tm ttemper
tr triangles, or angles
tx texture
uf unfinished surface
ve vertical
W1 wall, very thick (more than 8 mm.)
W2 wall, thick (6–8 mm.)

W3 wall, medium (4–6 mm.)
W4 wall, thin (2–4 mm.)
W5 wall, very thin (less than 2 mm.)
wa wavy
wh white
ye yellow
1 very dark (color), large, wide, thick, coarse (size), or good
2 dark, large, wide, thick, coarse (size), good
3 medium (referring to any quality)
4 light (color), small, thin, fine (size), poor
5 very light (color), small, thin, fine, (size), poor
/ this symbol, when occurring between two others, means that both conditions described are present, with the condition described by the first symbol more prominent.

The reader should be reminded that the above set of symbols is intended to refer only to Southwestern sherds, although additions to the list of symbols, covering characteristics embodied in the wares of other areas, is, of course, possible.

Let us illustrate the method by reducing to formula a group of wares designated by Steward, "Great Salt Gray and Punched" (Steward, 1936, pp. 6–10): (1) plain, (2) punched, (3) incised, (4) applied decoration.

(1) P-gr2-tx3-tm4-wh-fr4; in-gr2-st; ex-gr2-fl.
Translated, this reads: Salt Lake Plain Gray has dark gray paste of medium texture, fine white temper, poorly fired; the interior surface is plain dark gray with striations; exterior surface is plain dark gray floated.

(2) P-gr2-tx3-tm4-wh-fr4; in-gr2-st; ex-gr2-fl-id-pe-do3-sa-bt-ln-ho-nk/ao.
Translation: Great Salt Lake Punched has dark gray paste of medium texture, fine white temper, poorly fired; interior surface is plain dark gray with striations; exterior surface is dark gray floated, decorated with indentations of medium size in the form of shallow, round depressions punched by a blunt instrument and arranged in horizontal lines usually on the neck only, but sometimes all over the body.
Several types of incised decoration are described by Steward (*Ibid.*, p. 7). The following formula applies to "specimen 9353a":

(3) P-gr2-tx3-tm4-wh-fr4; in-gr2-st; ex-gr2-fl-is-ln-dh-ho-se-nk-rf.
Translation: Specimen 9353a has dark gray paste of medium texture, fine white temper, poorly fired; the interior surface is plain dark gray with striations; exterior is dark gray floated, decorated with

deep incised horizontal lines arranged in series on the neck only and covered with fugitive red.

(4) P-gr2-tx3-tm4-wh-fr4; in-gr2-st; ex-gr2-fl-ap-ov4-pe-po-ln-ho-sn-nk. Translation: Great Salt Lake Gray Applied Ware has dark gray paste of medium texture, with fine white temper, poorly fired; the interior surface is plain dark gray with striations; the exterior surface is dark gray floated, decorated with applied small oval pellets perforated with a pointed instrument; the pellets are arranged in single horizontal lines on neck only.

It is scarcely necessary to say that the "translations" given above are for demonstration purposes only, and that in actual practise the formulae alone are used in preliminary comparisons. By superimposing the formulae, one receives demonstration of the author's contention that "these wares are identical except for the addition of plastic exterior decoration," while the formula specifies the details of the decoration for ready comparison.

(1) P-gr2-tx3-tm4-wh-fr4; in-gr2-st; ex-gr2-fl.
(2) P-gr2-tx3-tm4-wh-fr4; in-gr2-st; ex-gr2-fl-id-pe-do3-sa-bt-ln-ho-nk/ao.
(3) P-gr2-tx3-tm4-wh-fr4; in-gr2-st; ex-gr2-fl-is-ln-dh-ho-se-rf.
(4) P-gr2-tx3-tm4-wh-fr4; in-gr2-st; ex-gr2-fl-ap-ov4-pe-po-ln-ho-sn-nk.

It should be noted that traits are always set down in the same order, that the formula starts with paste, follows with interior surface, then exterior surface. Regularity of order is necessary for comparison by superposition. Qualifying attributes follow immediately after the traits they refer to. Thus, "large white temper" is written: tm2-wh. "Light gray exterior surface covered all over with moderately large applied nobbins which have been pinched and perforated with a sharp instrument" would be written: ex-gr4-ap-do2-pi-pe-po-ao. "Interior surface covered with bright medium yellow slip on which very broad horizontal lines in dense black glaze paint have been painted," would read: in-sl-ye3-bi-pa-bl1-gl-ln1-ho.

Another example, taken at random from the literature at hand, will show how the formula may be used with painted pottery. Hargrave (1932, p. 21) describes Tusayan Black-on-Red as follows: "Gray paste often burning pinkish or yellowish; yellowish sherd temper; temper conspicuous in cross section and in surface of vessels. Constructed by coiled method. Texture moderately coarse and irregular. Vessels moderately hard and durable. Surface color red, often pinkish or yellowish.

Red of slip often permeated walls of vessels and changed color of the paste. Interior and exterior surfaces of bowls polished and coated with red slip. Sherd temper always easily detected through slip on one surface and sometimes on both surfaces. Forms: bowls, jars, and jugs. Interior surface of bowls decorated with black painted designs; exterior never painted. Exterior surface of jars painted with black designs. Patterns usually composed of simple elements of diagonal, horizontal or wavy lines. Bottoms of bowls are often decorated. Bowl forms predominate; often have a single horizontal handle." Let us assume that bowl sherds only have been recovered (interior decoration only):

P-gr/rd5/ye-tx2-tm3-sh-ye-fr2; in-rd/rd5/ye-sl-rd-pa-bl-ln-di/ho/wa; ex-rd/rd5/ye-sl-rd.

Formula for jars of the same ware:

P-gr/rd5/ye-tx2-tm3-sh-ye-fr2; in-rd/rd5/ye-sl-rd; ex-rd/rd5/ye-sl-rd-pa-bl-ln-di-ho-wa.

An investigator sorting dozens of sherds, without whole vessels, by formula would have an accurate check to his conclusion that the sherds were of the same type with different shapes being represented.

The use of this method is, of course, no substitute for accurate observation, nor does it solve the problem of making the following characteristics of pottery more objective. (1) Colors have probably not yet been reduced to sufficient standardization, in ceramics at least. The formula method presumes that the worker will state his criteria of color, whether they involve color wheel, comparison chart, or what-not. It is to be hoped that a standard method of making color descriptions comparable will be agreed upon by all archaeologists; and when this is done, the terms can of course be reduced to symbols and included in formulae. (2) The problem of size of temper and texture of paste also awaits solution. Although Hargrave and Smith (1936) have offered an objective basis for texture discrimination, agreement among field workers has not yet been achieved. (3) Firing of paste must also be regarded as containing a subjective element in most descriptions given to date.

Pottery description is not yet an exact science. Nevertheless, archaeologists do not hesitate to describe such features as those mentioned above, even though imperfectly, in prose. The formula method is merely a technique for making such descriptions more usable and comparable, and also for reducing the labor of comparison and description.

Allow me to summarize the possible uses of the formula method of notation. (1) In sorting sherd collections from hitherto uncollected regions, the use of the formula on sorting bags or labels provides an accurate method of establishing the types. After the formula, which

will include minor variations around a norm, has been established for a given type, the formula itself may be referred to on labels by number or letter, as "Formula A, Formula 1," and the like, before the relationship or independence of the type is sufficiently established to give it a name. The use of the formula provides a ready and accurate check at all times. (2) The comparison of a newly collected type with those already known and named, provided the latter are expressed in formulae, is a matter simply of rapid superposition of formulae and checking for similarities and dissimilarities. When, as is often necessary, a large number of types must be "run through" to establish the affinities of a newly collected type, the use of the formula method of comparison may eliminate an enormous amount of search through the literature or, if they are available, an exhaustive handling of comparison sherds. (3) In publication, if each ware described is also accompanied by its formula, a certain amount of confusion would be eliminated in the minds of readers; a satisfactory check would be provided for the benefit of skeptics; and, in many cases, space would be saved in publication.

It seems that a clearing house for newly discovered wares might be established, say, in the pages of AMERICAN ANTIQUITY, where field workers might report the formulae of wares concerning which they were uncertain. A page in each issue would probably take care of the requirements and would be an inexpensive contribution toward putting the classification of ceramics on a more systematic foundation. Perhaps once a year an agreed formula list could be issued, containing the formulae of all established wares.

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GLYPHS Z AND Y OF THE MAYA SUPPLEMENTARY SERIES

E. WYLLYS ANDREWS[14]

THE Supplementary Series at Yaxchilan is characterized by the presence of two glyphs usually absent at other sites. The two are commonly known as the "extraneous glyphs," but this is rather a misnomer, for at this site they form an apparently integral part of the lunar count. In this paper, we are assigning the letter *Z* and *Y* as names for the two glyphs.

Glyph Z has as its most important characteristic a cartouche with five dots or small circles arranged in a consistent manner. This element is included as the headdress of the head variant form. Glyph Y is also constant in its form, having a characteristic oval central element (Figure 1) to which are attached two arms and two legs and a rather variable element in the place of the head. Due to its peculiar appearance, Glyph Y has often been called the "beetle-glyph."

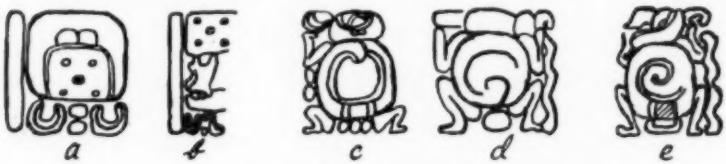

FIG. 1.—Glyphs Z and Y at Yaxchilan.
a.—Lintel 26; b.—Lintel 21; c.—Lintel 46; d.—Lintel 29;
e.—Lintel in Berlin Museum.

The first mention of these glyphs was by Morley in 1916,[15] where the latter called attention to the existence of Glyph Y, but offered no suggestion as to its meaning. In 1920, the same author[16] cited a series of examples of Glyph Z, and stated them to be examples of composite numerals. By this, he meant that the glyph itself expressed a numerical value of 10 to be added to the value of the coefficient attached. He quotes one case from the Temple of the Cross at Palenque where Glyph Z is used in place of Glyph E, with a coefficient of five. Subsequent research has shown that the reading here is "5 days" rather than the

[14] Harvard University, Cambridge, Massachusetts.
[15] Morley, 1916, pp. 369 and 385–6.
[16] Morley, 1920, pp. 168–169, fig. 31.

"15" ventured by Morley. As no substantiation can be offered Morley's thesis from the other, still untranslated examples he quotes, we must discard the "composite numeral" hypothesis as an explanation for this glyph.

There recently appeared a paper by Dr. Hermann Beyer[17] under the title, *Another Mayan Hieroglyph for "Day,"* in which the author attributes the implied meaning to Glyph Z. Insofar as he interprets the

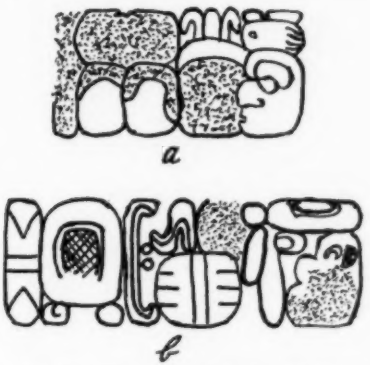

FIG. 2.—"Extraneous" glyphs at Ixkun.
a.—Ixkun, Stela 1; b.—Ixkun, Stela 2.

glyph to mean "day" when used in connection with a statement of the moon age, we believe Dr. Beyer is perfectly correct. This is quite obvious in cases such as that on the Temple of the Cross at Palenque where the glyph is actually used in place of Glyph E, and its coefficient must refer to the moon age.

These cases are the exception rather than the rule, however, and there are numerous cases which Dr. Beyer has not considered in which such an interpretation would be difficult if not impossible. Such a case would be that of Lintel 21 at Yaxchilan, where the Supplementary Series follows an Initial Series of 9.0.19.2.4.–2 Kan 2 Yax. In this inscription, a moon age of 27 days is declared by Glyph E with a coefficient of 7; before this, we find Glyph Y without a coefficient preceded by Glyph Z with a coefficient of 5. 5Z here can definitely not be considered a moon-age declaration; that matter has already been taken care of by Glyph E and its coefficient. The translation "5 days" cannot be

[17] Beyer, 1936.

accepted in this case without considerably more explanation than Dr. Beyer has offered in his short paper. Parallel situations occur at the same site on the front of Stela 11, Lintel 29, and on the lintel in the Berlin Museum (Table 1).

TABLE 1[18]

OCCURRENCES OF GLYPHS Z AND Y IN THE SUPPLEMENTARY SERIES

No.	Site	Monument	Date	G	F	Z	Y	E	D	C	X	B	A
1	Copan	Stela A	9.14.19.8.0.	5	*	–	*	–	15	6	?	*	9
2	Holactun	T. of I.S.	9.15.12.6.9.	0	*	–	*	–	2	2	2	*	10
3	Ixkun	Stela 1	9.18.0.0.0.	0	*	?	?	4	*	6	6	*	9
4	Ixkun	Stela 2	9.17.9.0.13.	4	*	?	?	–	5	3	3	*	10
5	Yaxchilan	Stela 1	9.16.10.0.0.	*	*	–	*	3	–	1	2	*	10
6	Yaxchilan	Stela 4	?????????????	–	–	5	*	–	–	–	–	–	–
7	Yaxchilan	Stela 6	9.11.3.10.13	–	*	–	9	6	–	2	3	*	9
8	Yaxchilan	Stela 11f	9.16.1.0.0.	0	*	6	*	12	–	4	5	*	9
9	Yaxchilan	Stela 11s	9.16.1.0.0.	–	*	–	6	12	–	5	*	*	10
10	Yaxchilan	L. 21	9.0.19.2.4.	–	*	5	*	7	–	3	4	–	9
11	Yaxchilan	L. 26	9.14.17.12.0.	6	*	–	6	13	–	4	–	*	10
12	Yaxchilan	L. 29	9.13.17.12.10.	–	*	5	*	15	*	5	4	*	10
13	Yaxchilan	L. 46	9.12.9.8.14.	3	*	–	2?	14	–	3	4	*	10
14	Yaxchilan	L. Berlin	9.15.6.13.1.	0	*	5	*	11	–	5	5	*	10
15	Yaxchilan	Altar 3	9.16.1.9.3.	3	*	–	3	17	–	5	5	*	10
16	Yaxchilan	Str. 44	9.12.8.14.1.	2?	*	–	6	8	–	5	5	*	9

Indeed, we believe that one can go no farther than to say that our Glyph Z under certain conditions is used with the meaning "day"—a meaning which might be derived much more from its position in the inscription than the form of the glyph itself. We can point out a homologous situation in the inscription of the Temple of the Foliated Cross at Palenque. Here, the glyph in Figure 3 is used with a coefficient of 10 in place of Glyph D. Whether Teeple's translation of this glyph[19] as "New moon day," or "Same moon age" is correct or not, we believe that in this case the glyph is to be interpreted merely as "day" because of its position in the inscription. Great caution must be exercised in discriminating between the actual inherent meaning of Maya glyphs and their transitory significance in this characteristic process of substitution.

[18] In this table, the symbol "*" means "present"; "–" means "absent."

[19] Teeple, 1931, p. 69.

A study of the known occurrences of Glyphs Y and Z has brought out the following information as to their meaning.

I. The occurrences of Glyphs Z and Y follow certain definite rules: (a) Glyph Z never occurs without Glyph Y. (b) Glyph Y does occur without Glyph Z. (c) When both glyphs are present, Z always has a coefficient. (d) There may be no coefficient when Y is alone.

II. It can be demonstrated mathematically that the variation of their coefficients is not governed by any cycle of an integral number of days. Glyphs Z and Y are, therefore, not dependent upon the mechanism of the Initial Series in the manner of Glyph G.

FIG. 3.—Palenque, Temple of the Foliated Cross. Glyph used in place of E.

We can demonstrate by the following mathematical process that the variation of coefficients of Z and Y is not controlled by a cycle containing an integral number of days.

If we take an identical pair of Z-Y combinations, reduce their Initial Series to Maya Days and subtract one from the other, the resulting difference would by necessity represent either the cycle or a multiple of the cycle—if such exists.

1) Yaxchilan, Lintel 29.....9.13.17.12.10.....5Z.....Y..
2) Yaxchilan, L. in Berlin.....9.15.6.13.1.....5Z.....Y..

1)		2)			
	1,296,000		1,296,000		
	93,600		108,000		
	6,120		2,160	2)	1406421
	240		260	1)	1395970
	12		1		
					10451 = *A*
M.D.	−1,395,970	M.D.	−1,406,421		

3) Yaxchilan, Str. 44.....9.12.8.14.1.....Z abs....6Y..
4) Yaxchilan, Lintel 26.....9.14.17.12.0.....Z abs....6Y..

3)		4)		
	1,296,000		1,296,000	
	86,400		100,800	
	2,880		6,120	4) 1403160
	280		240	3) 1385561
	1		0	
	M.D.−1,385,561		1,403,160	17599 = *B*

If such a cycle as we have outlined exists, the two intervals *A* and *B* would both have to correspond to the above conditions. This is not the case. No number can be divided evenly into both *A* and *B*. Indeed, *A* is divisible only by itself and by 1. We assume, therefore, that there is no cycle of an integral number of days governing the variations of the coefficients of Z and Y.

III. The variation might be caused by relationship to some astronomical phenomenon, but intensive examination failed to invest any such properties in the numbers *A* and *B* derived above.

IV. On Stela 11 at Yaxchilan, the start of the "Period of Uniformity" in lunar calculations is recorded. The Initial Series 9.16.1.0.0. is given twice with a "uniform" and a "non-uniform" Supplementary Series. It is significant that the Z-Y combination changes along with the lunar reckonings. This is strong evidence that Glyphs Z and Y are related in some way to the moon count.

V. Grounds for considering the coefficients of Z and Y as ritualistic rather than chronological are:

(1) The evidence presented in paragraphs II to IV above, although entirely negative, points to this conclusion.

(2) The coefficients never are higher than 9. Indeed, in eight out of the eleven cases where a coefficient is found, it is either 5 or 6, and two of the remaining cases are quite doubtful: (a.—) Glyph Z on Stela 6 at Yaxchilan precedes Glyph F, which is a unique situation, while (b.—) the coefficient of 2 on Lintel 46 at that site is quite possibly ornamental rather than numerical.[20]

(3) Glyph Z occurs very frequently in the inscriptions outside the Supplementary Series. In none of these cases does it have a coefficient. It is found, for example, at Copan on Stelae *A*, *B*, and *J*, and in the stucco inscription of the Templo del Conde at Palenque.

[20] The apparent prevalence of 5 and 6 as coefficients suggests the possibility of a reference to the 5 and 6 lunation division of lunar eclipse intervals.

VI. Not only do we find these glyphs inside the Supplementary Series, which is a lunar count, but also they appear not infrequently in connection with lunar glyphs outside the Supplementary Series, as on the above-mentioned Palenque inscription.

We may sum up by saying that we believe these two glyphs to be connected in some as yet unknown way with the lunar count. The coefficients may be of other than strictly numerical significance. If the above material by no means solves the meaning of this enigmatic pair of glyphs, and the conclusions reached are of a strictly negative character, we believe they will at least point the way for future investigations.

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A CACHE OF WOODEN BOWS FROM THE MOGOLLON MOUNTAINS

FRANK C. HIBBEN[21]

INQUIRY concerning the matter of prehistoric wooden bows of all varieties, from various institutions of the Southwest, has revealed an outstanding dearth of such articles from this section. Most museums of the country are blessed with only a fragment or two, or at best a few specimens of such bows. It may be, then, that the collection herein described is unique both as to numbers and variety of bows represented.

The find was made by the writer in an accidental and romantic manner when the monotony (?) of archaeological research in dry caves in the Middle Gila region of New Mexico was varied with a little lion hunting. The lion in question upon this occasion was a long-winded brute, and extended the hunt for many miles along the cliffs and canyon rims of the rough country just to the south of the Gila Cliff Dwellings National Monument. In skirting the side of a particularly rocky and precipitous gorge, the trail lay along a ledge about midway between the rim and the canyon floor. The lion tracks in the dust of the rock shelf led around a turn in the canyon wall and into a small and unimposing cliff house, perched in a hidden niche invisible from above or below. Nothing distinguishes the dwelling from hundreds of others in the region except perhaps its outstanding inaccessibility. However, the contents of the interior, evidently undisturbed since their original deposition, proved of exceptional interest.

In a rear corner of the pile of leaves and debris on the room floor appeared a number of wooden pieces, the topmost of a pile of wooden bows, representing about ninety-four specimens. These apparently had originally been stacked in the corner, but through disintegration by insects and the lairing of bears, had been broken and scattered over that whole section of the dwelling. The entire surface of the cave floor was littered with the remains of the shafts, foreshafts, and nocks of some four thousand compound arrows, broken without exception.

The aspect of this prehistoric arsenal, at first depressing and indicative of the destruction of passing centuries, even at this time gave promise of explaining much concerning such projectile equipment which had not been discovered before. Subsequent restoration and study of these bows has not controverted such a prediction.

[21] Department of Anthropology, University of New Mexico, Albuquerque, New Mexico.

FIG. 1.—Prehistoric Cliff-Dweller bows.

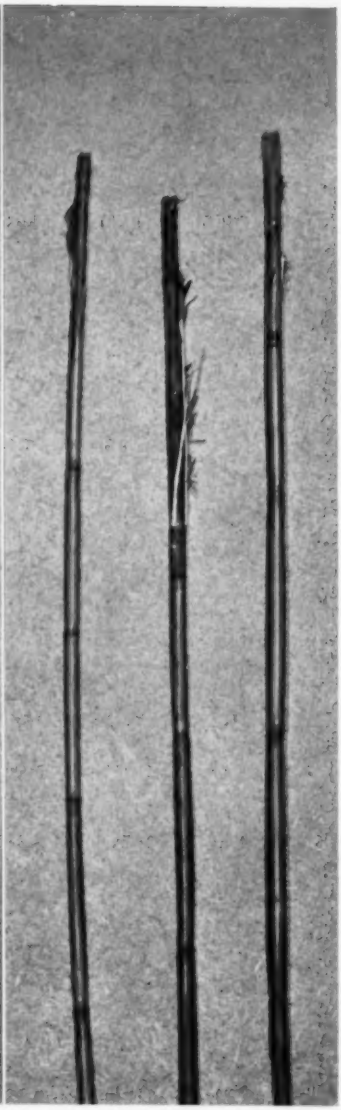

FIG. 2.—Prehistoric Cliff-Dweller arrow shafts.

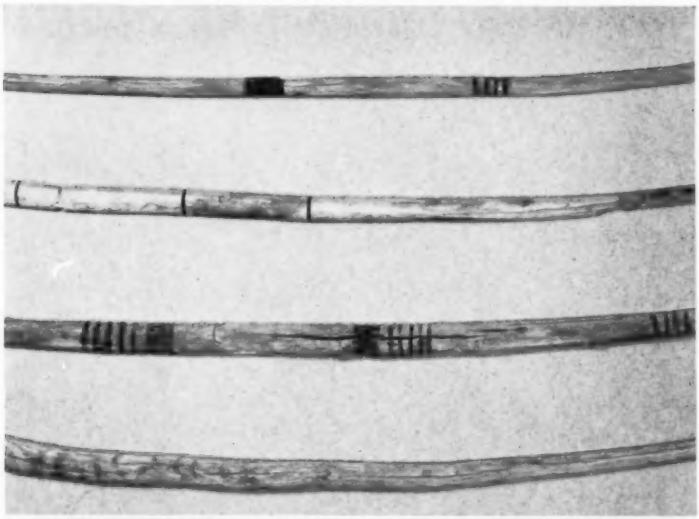

FIG. 2.—Bow ornamentation.

FIG. 1.—Bow tips.

Of the ninety-four bows represented, all but two are broken, apparently intentionally. Most of the specimens are broken in two parts, but some are fractured in three or more places. This condition may bear some analogy to the "killing" of certain grave objects, such as was practiced by the neighboring Mimbres peoples. The arrows also invariably display old breaks possibly suffered at the same time as the breaking of bows. However, there is no doubt, judging from their tracks and signs, that bear have augmented the breaking process.

The longest bow in the collection measures just short of five feet across its curve; the shortest is barely over three feet long and seems too small for any serious use. The average length of all specimens which are restorable is close to four and one-half feet (Plate 3, Figure 1). The cross sections at the grips vary from round to oval, plano-convex, or semicircular in outline. Round cross sections tapering to slightly flattened plano-convex sections at the tips represent the most prevalent style. The tips are usually slightly turned back to receive the string, and a fair majority are notched on both sides (Plate 4, Figure 1). However, some of the tips are finished in no way for the accommodation of the cord, and taper to a blunt point with no notches. Only one of the bows still retains a fragment of string of yucca fiber of the thickness of heavy twine.

Sixteen of the bows retain some of their original decoration, which is invariably in the form of stripes and bands of black and red pigment at intervals around the circumference of the bow staves (Plate 4, Figure 2). The usual scheme consists of a band in the region of the hand grip, augmented by a series of narrower bands on both sides of this center, and a final series of stripes towards the tips. There is no evidence of any leather grips or further accouterments.

The following woods have been identified from the collection: black oak; pinon; pine; willow; mountain mahogany; sycamore. The wood of many of the bows is unknown, or identification was not attempted because of the desire to avoid injuring the specimens by making cross sections for this purpose. However, there is no doubt that oak is the favorite, both for the bows and for the tips of the arrows. No especial selections of fine woods is indicated by the bow makers, as knots are frequent and in some cases would seem to impair the resiliency of the piece. As a whole, the surfaces are finely finished and possibly were at one time polished.

The arrows are of the usual compound variety such as have been recovered in fair numbers upon previous occasions from similar sites

in New Mexico and Arizona. Only eleven foreshafts out of this great number are notched for stone heads. All of the others have wooden points, some of which are eight inches long, tapered, and fairly sharp. The arrow shafts are of sacaton reed augmented with gut bindings (Plate 3, Figure 2). There are invariably three feathers on those specimens which still have any at all. The nocks are gaily decorated with blue red, yellow, and black stripes and crosses in an endless variety of combinations, evidently serving as property marks.

Several large sherds of typical classic Mimbres pottery may give some indication as to the affiliations of this remarkable cache. The collection gathered so far is one retrieved only from a superficial examination of the surface of this cave house. Who may say what perishable treasures yet remain beneath the dust and bat guano of the floor? A complete survey of this cave and others in the vicinity will be undertaken in the coming season.

METEORITE COLLECTING AMONG ANCIENT AMERICANS

H. H. NININGER[22]

DURING the past two years the field activities of the Nininger Laboratory (now the American Meteorite Laboratory, Inc.) have brought to light four new meteorites on old Indian camp sites in eastern Colorado (Plate 5) and western Kansas. The mere fact of these several associations strongly suggests that the aborigines recognized a special significance in these fallen stones. However, it must be admitted that, without additional evidence, these associations could be regarded as accidental.

There are other reasons for suspecting that ancient Americans regarded meteorites of special importance. The Winona meteorite, 1928, was found in a stone cist similar to those in which the former inhabitants of Arizona buried the bodies of children. The Navajo irons, 1922, were found covered by a pile of stones and their surfaces bore numerous grooves which had been laboriously cut by the stone implements of ancient man. Under one of the irons were found certain ornaments. The Mesa Verde meteorite, 1922, was found in the ruins of the Sun Shrine House of the Mesa Verde National Park. The Pojoaque meteorite, 1930, was found buried in a pottery vessel on an old village site. It showed signs of much handling and is thought by Dr. H. P. Mera to have been carried in a medicine pouch. Recent investigations by the present writer indicate that this little specimen was a part of the Glorietta meteorite, the site of which is about thirty miles from the Pojoaque site. This fact furnishes additional evidence of human possession.

The meteorites of Red River, Wichita County, Iron Creek, Willamette and Cape York, all are known to have been the objects of regular pilgrimages on the part of local tribes of early Indians. The Chilcoot iron, 1881, was found in the sacred possession of an Alaskan tribe and was reputed to have been so held for several generations.

The Casas Grandes iron was found buried in the Casas Grandes ruin of Chihuahua. It was wrapped in "mummy cloth" which indicates very definitely the special regard in which it was held. The Huizopa irons were also taken from a ruin in western Chihuahua. Worked fragments of meteoritic iron were found in the Hopewell Mounds, 1902, and in

[22] Director, American Meteorite Laboratory, and Curator of Meteorites, Colorado Museum of Natural History, Denver, Colorado.

the Anderson Township mound of Ohio in 1884. A small axe shaped from a fragment of nickel-iron meteorite was excavated in a ruin in New Mexico and brought to the University of New Mexico. The specimen appears to have been shaped by rubbing on sandstone. These facts indicate the importance of an adequate knowledge regarding the recognition of meteorites on the part of all archaeologists and amateur collectors of Indian artifacts. It is safe to assume that many meteorites have been passed over as unimportant by collectors both professional and amateur.

The meteorites discovered by our Laboratory on old camp sites have been of the stony variety. This class of meteorite is most likely to be overlooked, because of the resemblance to certain terrestrial material. As has been pointed out in other of the author's writings, even geologists have generally failed to recognize stony meteorites until recently.

In the interest of more complete data regarding the frequency of meteorites in and upon the soil, the writer wishes to urge that all field workers take note of all dark-colored heavy stones found, especially if they show any shallow pittings ("thumb marks") or an indication of a surface fusion crust. Subject suspected stones to a few strokes of a carborundum stone and look for minute points of white metallic iron (Plate 6). If samples showing this indication are sent to our Laboratory, we shall greatly appreciate the coöperation and shall, in return, make final tests and report to the sender free of charge. A leaflet on the recognition of meteorites will be sent free to any one on request.

Stony meteorites from Colorado Indian camp sites: upper, from near Karvel, Lincoln County, 1937, ½; lower, from north of Springfield, Baca County, ½.

Sections of stony meteorites polished to show grains of bright nickel-iron: *a*—Gladstone, New Mexico; *b*—Farley, New Mexico; *c*—Hale Center, Texas.

SOCIETY FOR AMERICAN ARCHAEOLOGY
ANNUAL MEETING—1938

The third annual meeting of the Society for American Archaeology for the fiscal year 1937–38 was held in conjunction with that of the Central Section of the American Anthropological Association at the Milwaukee Public Museum in Milwaukee, Wisconsin, on May 13 and 14, 1938.

A luncheon meeting of the Council was held at noon on May 13. Only four members were present; Vice-President William A. Ritchie, Secretary-Treasurer Carl E. Guthe, Editor W. C. McKern, and Wm. S. Webb. Several matters of business were discussed informally. The request of the Editor for the appointment of an Associate Editor of AMERICAN ANTIQUITY was endorsed. As a result of proposals made by Dr. Moorehead to the Secretary-Treasurer, the question of establishing a new series of publications of the Society which would permit the issuance of long papers and reports was discussed at some length. It was finally decided to present the matter to all the members of the Council by mail for their consideration during the coming year. The nature and extent of possible coöperation by the Works Progress Administration in furthering archaeological research was talked over, but no decision was reached. A few other matters needing no action by the Council were reported upon informally by the Secretary-Treasurer. The meeting adjourned at two o'clock.

The third annual meeting of the Society was called to order by the Vice-President, William A. Ritchie, at the Milwaukee Public Museum late in the afternoon of May 13, 1938. About fifty people were present.

The report of the Secretary-Treasurer was read and accepted. The report of the Editor was read, upon the completion of which, it was moved by Wm. S. Webb, seconded and passed that "the Editor's report be accepted and the editor be authorized to secure an Associate Editor with the approval of the Council."

Glenn A. Black then presented the report of the nominating committee, which contained the following slate for officers and Fellows:

President, Edgar B. Howard
Vice-President, J. Alden Mason
Members of the Council for four years,
Frederica de Laguna and E. B. Sayles

Fellows,

Charles Amsden
Hermann Beyer
Frans Blom
Mary Butler
Fay-Cooper Cole
D. S. Davidson
Thorne Deuel
E. W. Gifford
James B. Griffin
Theodore McCown
J. C. McGregor
H. P. Mera
Sylvanus G. Morley
Eduardo Noguera
Lawrence Roys
H. J. Spinden
William Van Royen

Nominations from the floor were called for. There being none, it was moved by Mr. McKern and seconded by Mr. Black that "the nominations be closed and the Secretary be instructed to cast a single ballot in the name of the members present, for the slate as read." This motion having been passed unanimously, Vice-President Ritchie declared the new officers and Fellows duly elected.

There being no other business to come before the Society, the meeting adjourned shortly after 5:30 p.m.

Three half-day sessions were devoted to the reading of papers upon archaeological subjects, at each of which approximately one hundred persons were present. The two sessions on Friday, May 13, were joint sessions with the Central Section. The Saturday afternoon session was a meeting of the Society held after the close of the meetings of the Central Section. A list of these papers is appended.

FRIDAY MORNING SESSION

Georg K. Neumann, Two Late Prehistoric Populations of Central Illinois. (Lantern)

Earl H. Bell, A Preliminary Report on the Archaeology of the Lower Niobrara Valley. (Lantern)

Forrest E. Clements and Alfred Reed, Eccentric Flints of Oklahoma. (Lantern)

Mildred Mott and Charles R. Keyes, Do Certain Archaeological Manifestations in Iowa belong to History? (Lantern)

Gordon R. Willey, Ceramic Stratigraphy in a Georgia Village Site. (Lantern)

Vladimir Fewkes, W. P. A. Excavations at Irene Mound, Savannah, Georgia. (Lantern)

David B. Stout, Preliminary Report on the Excavation of Shell Heaps along the Green River in Western Kentucky. (Lantern)

FRIDAY AFTERNOON SESSION

J. B. Griffin, Hopewell and Hopewellian Pottery in the Mississippi Valley. (Lantern)

Frederick R. Matson, Jr., The Function of Grit as Tempering Material in Eastern U. S. Pottery.

Vincenzo Petrullo, Government Subsidy for Archaeology.

John C. McGregor, Archaeological Aims and Problems.

Madeline Kneberg, The Application of Classifications.

J. Joe Finkelstein, A Possible Interpretation of Culture Relationships in the Mississippi Valley.

Florence Hawley, Some Results in Dendrochronology in Two Middle Western Tree Ring Areas.

SATURDAY MORNING SESSION

Donald Collier, An Archaeological Reconnaissance in Peru. (Lantern)

SATURDAY AFTERNOON SESSION

James A. Ford, Outline of Southern Mississippi Valley Chronology. (Lantern)

Arthur R. Kelly, Archaeology of Southeastern United States. (Lantern)

William S. Webb, Cultural Sequence and Association in the Tennessee Drainage. (Lantern)

Richard G. Morgan, The Archaeological Picture in the Ohio Valley. (Lantern)

Waldo R. Wedel, Historic, Proto-historic and Prehistoric Archaeological Cultures in the Plains Area. (Lantern)

W. C. McKern, Cultural Chronology and Distribution in the Northern Mississippi Valley. (Lantern)

George I. Quimby, Archaeological Divisions of the Great Lakes Area. (Lantern)

William A. Ritchie, A Perspective of Northeastern Archaeology.

Respectfully submitted,

CARL E. GUTHE, *Secretary-Treasurer*

REPORT OF THE EDITOR

AMERICAN ANTIQUITY is confronted with a major problem; and its Editor, with another. The first of these problems has been created by the quantity of good material contributed for publication in the journal. Papers now on hand are more than adequate to fill all space available for major articles in the next five issues, and contributions continue to come in. Consequently, material submitted at the present time can not reasonably be expected to appear in print for more than a year. The printing of many preliminary reports on important programs of work is

thus held up, conceivably in instances appearing only after the publication of the detailed reports.

The size of the issue and of the annual volume of the journal depends entirely upon the size of the dues-paying membership of the Society, and the only solution to this problem would appear to be an abnormal rate of increase in the membership. I believe that the Society is now experiencing a healthfully normal rate of increase.

Ordinarily a normal membership growth should permit a corresponding increase in the size of the periodical. However, the withdrawal of the support initially provided by the National Research Council, and recent increases in the cost of printing—including a flat ten percent rise effective within the last month, have largely prevented such an increase. Actually, there are 384 pages in Volume III, as compared with 335 in Volume II, an increase of nearly 50 pages during the last year. Your Editor will continue to enlarge the contents of the volume as the budget permits.

The second major problem relates to the difficulty which I have experienced in finding the time to adequately take care of my editorial duties. These duties involve not only the preparation of copy for publication, and subsequent proof reading, but a considerable and growing amount of correspondence. I feel that the mounting pressure of other duties will not long permit me to continue in my present office. Anticipating the not too remote time when a successor shall be elected to take over editorial responsibilities, I should like to be authorized, if necessary, to appoint an Associate Editor, subject to endorsement by the Council, whose duties shall include familiarizing himself with editorial routine and policy. This arrangement would permit a new Editor, at the outset of his assumption to office, to benefit from the experience of the Associate Editor.

As to a detailed report on the last volume of AMERICAN ANTIQUITY, I prefer to let the journal speak for itself. I am particularly grateful for the splendid editorial assistance contributed by Mrs. Dorothy Schulte, and for the willing coöperative help of the Assistant Editors.

Respectfully submiettd,
W. C. McKERN, *Editor*

REPORT OF THE SECRETARY

The second annual meeting of the Society was held in conjunction with those of the American Anthropological Association and the American Folk-Lore Society at the Carlton Hotel in Washington, D. C., on

December 29, 1936. The minutes of this meeting were printed in AMERICAN ANTIQUITY, Volume II, No. 4 (April, 1937), pages 289–294. At this meeting the by-laws were amended, changing the beginning of the fiscal year from January 1 to July 1. Therefore, the present report covers nearly a year and a half of the activities of the Society.

During this period, the increase in the membership rolls has been most satisfactory, thanks to the interest and coöperation of the Fellows and Affiliates. The Secretary's office sent out, at irregular intervals, circulars to potential Affiliates calling their attention to the purposes and activities of the Society. In the membership figures given in the last Secretary's report, two Life Fellows were inadvertently counted twice. On December 10, 1936, there was a total of 572 names on the rolls. On April 30, 1938, these had increased to 786, a growth of about 37%. The changes in membership in terms of classes are given in the following table:

	Dec. 10 1936	With-drawn	Trans-ferred	Added	May 1 1938
Life Fellows and Affiliates	7	–	1	–	8
Fellows	40	−1	6	–	45
Affiliates	482	−33	−8	225	666
Institutional Members	43	−3	1	26	67
	572	37		251	786

In the period covered by this report, three institutions dropped their subscriptions, and twenty-four Affiliates resigned from the Society. The Society lost by death one Fellow, Dr. George A. West, and nine Affiliates: Amos Butler, H. H. Cherry, A. Barton Congdon, C. B. Cosgrove, E. C. Ewing, S. J. Guernsey, Fred McArthur, A. Blair Ridington, and D. D. Van Osdol.

Since December, 1936, the Council authorized the holding of three regional meetings of the Society. The first of these was at Iowa City, Iowa, in April, 1937, in connection with the meetings of the Central Section of the American Anthropological Association. The second took place in June of that year at Denver, at the time of the summer meetings of the American Association for the Advancement of Science. The third regional meeting was held in December, 1937, in New Haven in connection with the annual meetings of the American Anthropological Association and the American Folk-Lore Society. In the spring of 1937, the Council authorized the expenditure of $25.00 a month for secretarial assistance to aid the officers in furthering the work of the Society. The

Council also set the time for the third annual meeting of the Society as May 13, 1938, in Milwaukee, Wisconsin, in connection with the meetings of the Central Section of the American Anthropological Association. Last month, the members of the Council voted upon the nominations for Fellows in the Society.

Early in 1938, the President, Dr. Kidder, because of his absence from the country during the spring of the year, delegated to Mr. McKern, the Editor, his authority to approve the applications of prospective Affiliates in the Society during his absence. A few weeks later, the President appointed two committees in connection with the third annual meeting of the Society. The first of these was a nominating committee consisting of Paul S. Martin, chairman, Glenn A. Black, and Henry B. Collins, Jr. The second was a program committee (James B. Griffin, chairman, W. C. McKern, and Charles R. Keyes) which coöperated with the officials of the Central Section in preparing the program.

Respectfully submitted,
CARL E. GUTHE, *Secretary*

REPORT OF THE TREASURER

The present balance (May 1, 1938) of the Society stands as follows:

Regular Fund	$770.44
Permanent Life Membership Fund	412.55

REGULAR FUND

Gross Receipts

Balance on hand, December 10, 1936			$ 534.36
Dues:			
1936	$ 411.00		
1937–38	1966.50		
1938–39	54.00		2431.50
Sale of Volumes I and II of AMERICAN ANTIQUITY		$231.00	
Sale of extra copies of AMERICAN ANTIQUITY		8.00	239.00
Reimbursements			
Reprints of articles	$ 153.41		
Illustrations	158.86		312.27
			$3517.13

Gross Disbursements

AMERICAN ANTIQUITY (5 issues)		
Printing and Illustrating	$2023.47	
Distribution	52.00	
Reprints	194.68	$2270.15
Stationery		68.98
Postage and telegrams		115.72
Secretarial assistance (10 months)		250.00
Bank service charges		27.49
Discounts to subscription agencies		14.35
Cash on hand, May 1, 1938		770.44
		$3517.13

Resources

Cash on hand, May 1, 1938	$ 770.44
Due from 1936 dues	87.00
Due from 1937–38 dues	367.50
Due from reimbursements (reprints)	87.83
Due from reimbursements (illustrations)	20.40
	$1333.17

Liabilities

Dues for 1938–39 already paid	$ 54.00
Bills payable	5.10
AMERICAN ANTIQUITY, Vol. III, No. 4 (not yet submitted)	?

PERMANENT FUND

Receipts

Balance, December 10, 1936	$ 350.00
Dues from one Life Affiliate	50.00
Accrued interest	12.55
	$ 412.55

Disbursements

None	$ 000.00
Balance, May 1, 1938	412.55

Respectfully submitted,
CARL E. GUTHE, *Treasurer*

FACTS AND COMMENTS

REINDEER LAKE POTTERY

In the summer of 1936, while travelling on Reindeer Lake in northern Saskatchewan, a collection of potsherds was brought to me by a trapper-prospector, William Douglas. These sherds were found in what appears to have been a well-established camp site on an island about one third up the lake. The lake itself is approximately 140 miles long and, like most lakes of the Precambrian Shield, filled with thousands of islands. The find was quite a random one but because of the high latitude would seem of particular interest. The position of the site is approximately 56°35′ north latitude. To complicate the problem is the fact that both historically and in the tradition of the Crees and Chippewyans the lake has always been the almost exclusive territory of the "Idthen-eldeli," Caribou-Eater branch of the Athabascan-speaking Chippewyan. The Churchill River, into which the outlet of Reindeer Lake flows seventy miles to the south, has traditionally and historically been the dividing line between these two peoples.

The pottery specimens brought out in 1936 nearly completed the rim of a pot, and there were a few sherds, judging from texture and shape, obviously parts of one or possibly two other pots. The only decoration which appeared on these sherds was a pitted and embossed effect as listed under "1," Impressed Variants, "b," by Dr. Fewkes in his description of the potsherds from Red River, Manitoba.[23] Subsequent examination of the potsherds described by Dr. Fewkes proved the Reindeer Lake sherds, at least in general appearance and decoration to be very similar.

The potsherds were a surface find and were in conjunction with many quartz and some flint flakes, though no other artifacts were found at the time.

In 1937, I again travelled over the lake but, due to difficult conditions and a limited amount of time, I was unable to visit the site although I secured more of apparently the same group of sherds.

These potsherds are now in the possession of the National Museum of Canada, Ottawa. I might also mention that a quantity of potsherds were also collected at The Pas, Manitoba, from sites along the north bank of the Saskatchewan River, which are likewise in Ottawa.

P. G. Downes
Belmont Hill School
Belmont, Mass.

RECORDING OF CAVE DATA

During the summer 1934, my wife and I were faced with the problem of excavating a dry cave that gave promise of being unusually valuable in the study of the ancient Indian cultures of southern Nevada.

[23] American Antiquity, Vol. 3, No. 2, pp. 143–155.

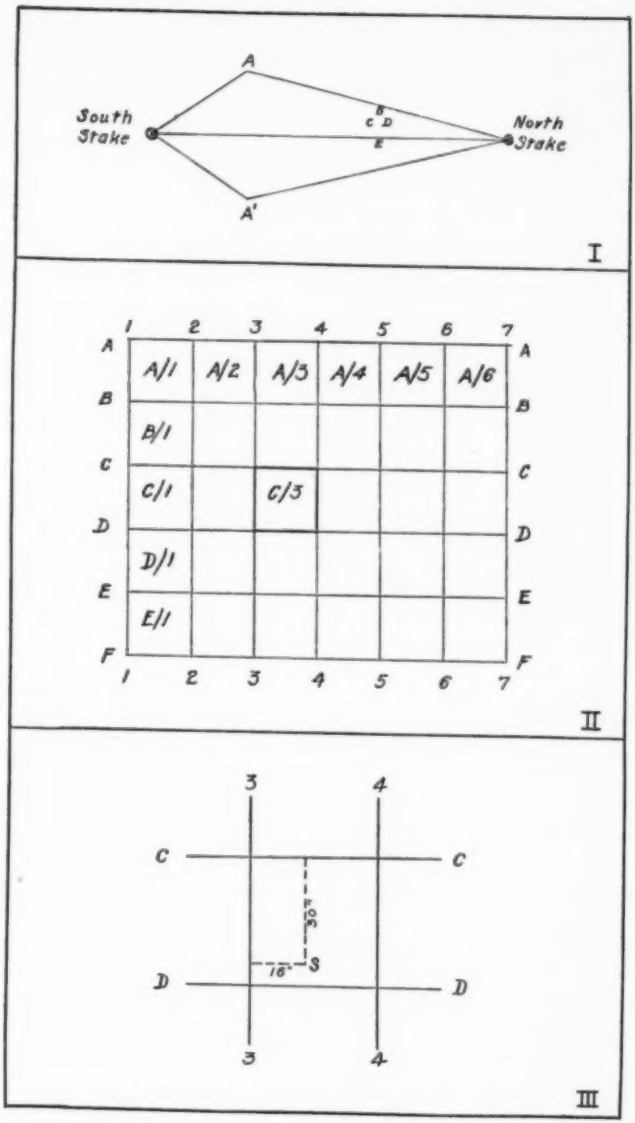
A
South Stake
B
C D
E
North Stake
A'
I
1 2 3 4 5 6 7
A
B
C
D
E
F
A/1 A/2 A/3 A/4 A/5 A/6
B/1
C/1 C/3
D/1
E/1
II
3 4
C C
D D
3 4
III

FIG. 4

It appeared to us that the system of recording specimens by making measurements from reference stakes was inaccurate, susceptible of errors in recording, and would require too large a proportion of the available time for making the records: inaccurate, because many objects close together (Figure 4, I: b, c, d, & e), could not be plotted in accurate relationship when a study of the material was being made, perhaps months later; susceptible to error, because it was found by experience that mistakes were frequently made in stating on which side of the base-line the specimen was located, thus causing an object at "A" (Figure 4, I) to be recorded as being from "A'"; require too much time, because of the necessity of leaving one's position, securing the tapes, and returning to take the measurements. If the tapes were loose or only one available, two people would be required, one at each end. If two tapes were at hand and one end of each attached to its respective stake, one person could make the measurements, but only one specimen at a time could be recorded.

If a system were devised whereby all persons working could simultaneously and independently record data without moving from their positions, much time could be saved.

With this purpose in mind, we finally decided to use a system of rectangular coordinates. We marked lines on the ground dividing the area into squares three feet on a side. The lines of this grid running north and south were designated by letters and those running east and west by numbers (Figure 4, II). The squares were then designated by the coordinates of their southwest corner, as C/3 in the figure. Excavation was then conducted by squares thereby reducing the possibility of making the error of recording a specimen in the wrong section.

When a specimen was uncovered, as at "S" (Figure 4, III), the distances from the south and west boundaries of the square were measured with a yardstick without the necessity of changing position. In the figure we find these measurements for our sample to be sixteen inches and thirty inches respectively. The horizontal position of our specimen may now be expressed by the amplification of the general square designation, thus: C −30/3 −16. The measuring of the depth completes our data. Our specimen is now recorded as C −30/3 −16, depth ten inches, which may be expressed as $\frac{\text{C} -30/3 -16/}{10}$. The dash is used in place of the plus sign in order to simplify the typing of the data. It is apparent that C −30 means C plus thirty inches toward D and 3 −16 means 3 plus sixteen inches toward 4.

No matter how close together the specimens are, this method will enable any person, even though he has never seen the site and no matter how much time has elapsed, to reconstruct the deposit and study the exact relationship that existed between the specimens before the excavation. It has also been found to put the data in shape for immediate plotting of key data on cross sections.

To supplement the data, cross sections of the deposit should be made showing the character of the various layers and the location of all floor-levels. One

cross section between each row of squares will enable an accurate picture of the deposit to be reconstructed at any future date. Additional cross sections will be required to show depth, outline, and method of construction of storage pits, graves, and the like.

With these data accurately recorded, it is possible to reconstruct in the laboratory such parts, or all if desired, of the deposit placing each item in its exact situation and enabling a comprehensive study to be made.

It is not suggested that this method be used except in caves, rockshelters, and other similar sites where the area is necessarily small and the specimens comparatively abundant.

If some such system were standardized for such sites, the data could then be published in pamphlet form containing: an itemized list of all specimens giving for each a brief description, culture (if known), the catalogue number, where deposited, and site designation; cross sections; such other sketches as necessary to clarify special situations. These pamphlets could then be supplied to all persons interested in the cultural area to which the site belongs, and a file of them would contain all the factual knowledge of that area.

The study and correlation of all the data from all the sites would be the duty of the research student. Whenever, in the course of his study, he required the examination of particular specimens, he would have at his finger tips, not only the information as to where they could be found, but also their catalogue numbers, reducing the time and correspondence necessary to secure the correct specimens. He would be able to work uninfluenced by the opinions of each field worker as set forth in the present type of report. Interpretations are subject to change with the advancement of knowledge, but the basic data are permanent if accurately recorded.

Conclusions may be disproven in the light of new discoveries, but the facts underlying them still remain. Too often it is only the conclusions and not the data which are considered, due, probably, to the fact that usually only the excavator has the facts, partly recorded and partly remembered. If the conclusions are discarded, the data may be lost and forgotten instead of being subjected to new study and fitted into their proper place. Therefore, I believe that the publication of the basic data is as essential to a complete excavation as the publication of the conclusions reached by the excavator.

S. M. WHEELER
Southwest Museum
Los Angeles, California

ANALYSIS OF SPIRO MOUND TEXTILES

Samples of textiles from the Spiro, Oklahoma, mound were sent to the Smithsonian Institution for analysis. Through the courtesy of Dr. Waldo R. Wedel and the National Bureau of Standards, which made the analysis, the report quoted below has been received.

These textiles were excavated by private individuals in 1935, before the

University of Oklahoma took charge. My object has been to salvage as much as could be rescued, and attempt to preserve it behind glass.

On the whole, the material is in a remarkable state of preservation. The first specimens reached me about three weeks after they had been excavated, and were quite damp. It is thought this dampness is a feature of recent years only, pits having been sunk by relic hunters and letting surface water into the central portion of the mound.

Most of the fabrics appeared to have been folded when placed in the mound but responded, in the case of the larger pieces, to careful manipulation. Some of the textiles exceeded three and four feet in length. These were pinned to fibre board and underwent a stretching process of weeks, the pins being moved outward a trifle each day. At the same time, quantities of lime, probably from shell, and perhaps from soft shell ornaments originally decorating the garments, were removed bit by bit.

Of the eight large pieces now preserved between sheets of stout glass, four have distinct negative patterns, while a fifth has a trace of one. Small textiles, in many instances so matted as to preclude separation of the layers, are protected in glass-topped boxes. A detailed description of the fabrics will be left to experts, unless the editor cares to give space to a non-technical article.

The report from the Bureau of Standards follows:

H. M. TROWBRIDGE
Bethel, Kansas

UNITED STATES DEPARTMENT OF COMMERCE (PLW:RM V11–5/7520–28526)
Washington
NATIONAL BUREAU OF STANDARDS
REPORT
on
TESTS OF FIBROUS MATERIAL
submitted by
SMITHSONIAN INSTITUTION
UNITED STATES NATIONAL MUSEUM
May 6, 1937.

Specimens of fibrous material brought to us by Dr. Wedel were examined microscopically for fiber composition, with the following results.

Samples B, C, F, J, K, L and M are made entirely of rabbit hair.

Samples D and G are made of yarns of rabbit hair wrapped around a warp thread of vegetable material. In sample D the vegetable material is a two-ply thread; in sample G it appears to be a mat of several strips of material.

Samples A and E are of feathers.

In sample A the feathers with strips of the skin are twisted around a two-ply thread of vegetable material.

The vegetable material in all cases was too ill-preserved to permit positive

identification. We believe, however, that it is of wood or bark rather than grass or straw.

Sample H is of hair which we are unable to identify positively. We would suggest that it might be buffalo or bear, or perhaps dog or horsehair. It is not of the rabbit type.

It is barely possible that the material we have called rabbit hair is from some related animal, such as the squirrel or the rat.

NATIONAL BUREAU OF STANDARDS
PLW

May 12, 1937.

SOME NOTES ON THE MANUFACTURE OF WAMPUM PRIOR TO 1654

Introduction

The coast of Long Island is dotted with shellheaps, both large and small, of which all but a few are true kitchen middens of the pre-white contact period. This is particularly true of the region investigated by the writer. from the New York City line to Stony Brook on the North Shore. In only one heap examined prior to 1936 did a single artifact of European origin present itself. In that instance, a badly corroded triangular arrow of iron was found in a pit surrounded by deep deposits of shell and other refuse that contained not one fragment of metal, glass, or crockery. In this heap the majority of arrow points were of local quartz, and triangular in pattern. The pottery was abundant, and though most sherds were of typical Long Island Algonkin vessels, there was a fair amount of definitely Iroquoian ware including a small, nearly complete, square-collared pot that cannot be distinguished from a Mohawk Valley specimen.

The manufacture of wampum may have been an important Long Island aboriginal industry but it is doubtful, to my mind, if it was an industry of any great antiquity. Of the dozen or more heaps examined or excavated by myself or friends from 1932 to the end of 1935, at Bayside, Glen Cove, Center Port, Northport and Stony Brook, only one contained definitely cut and ground whorls of whelks showing a well-advanced understanding of the methods best suited to the manufacture of small white wampum. This solitary midden at Northport contained some fifty carefully ground distal ends of the central stock, or columella, of a large univalve which, from its size and from the abundance of other parts of the shells nearby, were obtained from the "knobbed whelk," (*Fulgur carica*). This heap was the one that yielded the iron arrow point and Iroquoian pottery. Though the heap was large, there were but these half a hundred specimens of wampum "blanks" in the portion excavated by myself which embraced an area of some 40 by 35 feet. I am of the opinion that the greater part of the refuse was deposited not over 350 years ago.

In some of the other middens, occasional columellae of the same shell were encountered, but in no case did the work progress beyond the simple chipping away of the outer whorls. This condition, however, does not hold true of the

Peconic Bay region, where quantities of decomposing bits of shell were observed on a number of sites, still retaining sufficient shape to be recognizable as cut conch whorls. In no case did any specimen of advanced workmanship turn up to enlighten one on the methods employed in the production of the "black" or "Quahog" wampum.

In June 1936, word reached me of a small shellheap at the very gates of the Massapequa Fort on Fort Neck, south of the town of Massapequa. Friends who had dug there reported the heap as "poor." There were no stone specimens. Clay pottery was very scarce, and bone remains were non-existent. In fact, its chief interest lay in the amount of European white-clay pipes and the occasional brass arrow points present. A solitary brass bodkin or needle, perforated midway between both pointed ends, was also found. Except for the material, it was identical with some bone specimens found at the large Northport heap. Upon being shown the carefully worked conch columellae from the Northport site, my friend expressed the opinion that the whorls, such as I showed him, second only to the large hard clams, made up the bulk of the refuse.

The site in question was that of the square palisaded enclosure destroyed by Captain Underhill in 1654. It is situated almost on the end of the slightly elevated, gravelly point of land, surrounded by marshes, that is now called, "Fort Neck." It is less than one-half mile from the waters of Great South Bay. Faint traces of a ditch reveal the outlines of the original structure.

On the west side, probably at the former entrance, was a shellheap that had been as much as two feet in depth and a good fifty feet in length. The greatest width did not exceed thirty feet. The greater part had been dug over with potato and clam rakes. It is not surprising to find how little was recovered. The most interesting feature of the site, however, was the profusion not only of the cut columellae of whelks, but the hundreds of small bits broken out of the anterior end of gigantic hard clams. Though all were decomposed to a pale lavender shade, the centers, after being broken open, proved to be a deep purple. Here without a doubt was the site from which much of the early Dutch trade wampum was obtained.

As most of the deeper portion of the deposit had been turned over, I was forced to test around the edges for the sites of small individual workshops. This was not difficult as a sounding rod quickly pierced the sandy topsoil and came to a grating stop in the shell beneath. A half dozen such spots were found just outside of the main heap.

From material recovered from these sites, and from small sections of the deep debris overlooked by former diggers, as indicated by the bushes growing up through the shells which had been carelessly tossed aside, I have been able to reconstruct the scene as it was when the Massapequa occupied the area.

White Wampum

White wampum was made exclusively from the central stock of both *F. carica* and *F. canaliculatus*. As but few of the latter species attain sufficient size

to produce a columella sufficiently heavy to make a number of beads, and as almost all the debris resulting from chipping out columellae shows the typical "knobs" or protuberances of the large *F. carica*, it is to be inferred that the latter was the most used. That they were abundant there can be no doubt. Each distal end of a whorl from which no more beads could be cut represents a separate shell. By a conservative estimate, there were thousands of them in the heap. Most of those encountered by me were more or less decomposed to a sort of soft chalky consistency which would rub off on the fingers and dissolve readily in water. This was due to the shallowness of the covering above the deposits. Such specimens as I was able to recover from the meagre deep refuse, below the reach of frost and abundant moisture, were in a superb state of preservation.

In many other heaps, large numbers of perfect, or slightly damaged shells of both species were encountered. Here I did not find a single complete specimen. The only conclusion to be reached, therefore, is that, at an earlier date, the only value the mollusk represented to an Indian was as an article of food. How changed the picture here; no shell was wasted. By the large number of ends recovered that are completely riddled by boring worms, it seems logical that many dead specimens were gathered on the ocean beaches to swell the supply. If not too long dead, the columella remains undamaged, as I found by experiment.

The first stage in the course of manufacture was to break away all the outer whorls, leaving only the spiral center-stock. Next, with a chip of stone or a knife, the spire was cut off by sawing or notching around its circumference at the point where the first bead would be started. After this grooving had been carried far enough, the waste portion was broken off and discarded. In some cases this cutting seems to have been accomplished wholly with some abrasive implement, usually a bit of sharp-grained red sandstone. The fresh shiny surface of the interior of a periwinkle, as the shells are called locally, is of surprising hardness, and for this first step the quickest method would be employed. In severing finished beads, great care was shown and the narrow groove was carried deep enough to prevent any breakage in detaching the completed specimen.

A number of columellae were found with beads cut but not yet broken off. In the majority of cases it turned out that the shell had started to develop flaws that rendered it unsuitable for further bead production. The usual trouble was that the shell stock from that point on showed a decidedly laminated structure. The last bead sometimes split before it could be detached. In every case beads that were thus treated were of the small "council wampum" type, a quarter of an inch or less in length by about an eighth in diameter. From the diameter of some columellae, it must have been possible to produce much larger beads, but there was no definite indication of this being done. In fact, in the majority of instances, these heavy stocks were painstakingly ground down to a more or less standardized small cylinder. The demand at that time seems to have been heaviest for the small beads, possibly for use in the beaver trade with upstate Indians.

Occasional broken-bead-ended stocks show a depression which may represent the start of a perforation, probably made with a pointed nail, many badly rusted specimens of which occur. Smooth pebbles of quartz, quartzite, and other stones may have been the agents used to polish the completed beads but, if that were the case, they show no definite signs of such use. Many that might have served that purpose were observed.

In some portions of the heap a surprising number of long whorls (in many instances, of from four to five inches in length), were encountered. In all probability, not a single bead had yet been cut from them. Others were smaller but nevertheless they would still yield a considerable number of beads. That such valuable material should be discarded is unlikely. It is very probable that we owe these finds to the sudden termination of a flourishing industry on that fatal day, in 1654, when the Dutch destroyed the village.

Black Wampum

For some perverse reason, many writers have expressed vague, if not ridiculous theories on the original source and methods of producing the purple or "black" wampum. Though the color is so typical of the hard clam shell, the rich, dark purple occurring in no other local shell fish, at least in sufficient quantity to provide any amount of beads, some will persist in ascribing the origin of the material to everything but its true source. In answer to the assertion that the "Quahog" is not heavy enough, Beauchamp[24] provided abundant evidence to the contrary. From a shell measuring but four inches across, he secured a section of purple that was $\frac{3}{8}$ inch in thickness. Some small bits of material, cut from the muscle scar of large clams recovered from the Massapequa heap, are a little over that in thickness.

In an effort to locate the source of the large valves of *V. mercenaria* that abound on the site, I "treaded" for several hours in the shallow waters of Great South Bay and obtained numbers of mature clams that equal De Kay's extreme length of $4\frac{1}{2}$ inches. A few of the archaic specimens from the heap exceed that figure. However, all large clams are not highly colored but, as a rule, the rough, heavy, dark surfaced shells were the most richly purple within. As Beauchamp observed also, the anterior end has the deepest color, as well as the greatest thickness. Of interest also was the finding of a large specimen of *F. canaliculata* in shallow water a few yards off shore. I found no *F. caricas*, though the oystermen do get them in the deeper waters.

The production of the black wampum was a laborious process and in all probability was far more difficult than the white variety, hence the higher prices paid for it. The industry was extensive as hundreds of small squares and ovals of faded and eroded lavender shell testify. The only drawback to the study of its manufacture was the extremely poor condition of these "blanks" throughout the deposit.

[24] Wampum and Shell Articles, No. 44, Vol. VIII, N. Y. State Museum, Albany, 1901.

Here, however, the abundance of whole valves of the "Quahog," which probably represented discarded raw material that possessed no coloring, or too little for use, came to the rescue. During the months or years that these valves had lain on the floors of wigwams or on the surface of the heap before the stockade, they had been trod upon by the moccasined feet of many aborigines until they became completely and adamantly packed with refuse. This was carefully removed from each shell and broken apart. Material thus recovered had been preserved from water by its protecting roof of shell and when exposed was undamaged. In my hopes of finding perfect beads, I was disappointed, but enough uncompleted specimens were collected in this way to fully reconstruct the entire process employed by the Long Island Indians during the Dutch period up to 1654.

The first step was to break off the anterior end of suitable dark-colored valves. Many fragments were never worked beyond this stage, most generally due to an insufficient thickness of the purple shell. Then, with some light hammer and perhaps a sort of percussion flaker, the thin edges of this bit of shell were chipped away leaving a slightly curving "stick" of purple. The occasionally present heavy iron spikes would have served well as chipping hammers if grasped by the point so as to use the corners of the square head to deliver the blow. The numerous small nails would make good pressure-flaking tools. In some cases, quartz pebbles, with a few chips removed from one end in the manner of a "chopping stone," might have served as hammers. The next step was to grind away the chipped edges, which could be easily accomplished with the sandstone "abraders" recovered. Once a "blank" reached this stage, it was seldom abandoned, and I was fortunate in finding a few specimens that had been ground down to a flat surface on three sides and pointed on the ends. Beads cut from these would be irregular and would answer very well for those referred to by Beauchamp as "quite angular" purple beads.

One small fragment of shell has a hole drilled through it from the upper side, and another just started. These holes are quite small, about the diameter of a No. 50 or 52 drill under the present classification. This makes it possible that at least some "blanks" were perforated at the proper intervals before the beads were cut out, thereby facilitating the work of drilling. One small piece of shell has tapering sides like a truncated cone, and is of about the proper diameter for a small council wampum bead.

Without European tools, any form of wampum making was a slow and difficult labor, and even after their introduction the task was one that required a high degree of skill and no little patience. Articles recovered from this site that were quite probably implements of the shell workers' trade, and several that are problematical, were as follows.

Quartz or quartzite pebbles showing no battering beyond the removal of a few chips from one end. These may have been either hammerstones, smoothers, or perhaps only the source of the occasional quartz or quartzite flakes scattered through the heap.

Quartz chips, with the addition of one fragment of a chipped chert blade, represent virtually the only chipped-stone relics. They would have served well in sawing through the flinty shell, their greater hardness rendering them even more efficient than a steel or iron knife. Parker mentions finding a quartz chip with a number of cut and ground conch whorls at the Dosoris Pond Shellheap.[25] I myself found eight such whorls with a small triangular quartz blade in one spot at the Northport heap.

Several sandstone abraders, pieces of a very abrasive red sandstone, were recovered from the southwest section of the heap. All were ground square on one edge and apparently were fragments of one original slab. As this stone does not occur naturally on Long Island, it must have been brought in from elsewhere and small fragments of the original stone eagerly accepted by other workers. Grinding with this material was the most efficient method of shaping the hard columns of the "winkles" or "conches." Most fragments of the stone have at least three flat sides and the upper edge is ground to a "saddle back."

Iron nails and spikes, as before stated, were of common occurrence and might have served as either hammers, pressure flakers, or awls depending on the size. They are so badly corroded, however, that they resemble lumpy sticks of iron oxide.

The remains of an antler-handled iron-bladed knife were recovered but, as was to be expected, the blade was almost completely decomposed. Enough remains to show that it was crescent-shaped and about four inches in length. As far as can be determined, the cutting edge was on the inside of the curve, as is the case with a common oilcloth knife.

With the above articles, an Indian could and did produce thousands upon thousands of beads that eventually came to rest in Iroquoian graves hundreds of miles away, or endured for years in the form of belts, some of which may yet be in existence.

JAMES D. BURGGRAF
Trailside Museum
Bear Mountain, New York

[25] Parker, A. C., The Archaeological History of New York, Part 1, N. Y. State Museum Bull. 235, pp. 346–8, Albany, 1920.

CORRESPONDENCE

Architectural Nomenclature

Publication of the article on Chaco Canyon masonry types in the January, 1938, issue of American Antiquity, prompted the following letter of comments on nomenclature from the standpoint of a prominent architect who has specialized in western Mission architecture. Although I cannot agree with all of the suggestions, I believe that they merit serious consideration by archaeologists dealing with architectural material.

Florence Hawley
Department of Anthropology
University of Chicago

"Dear Dr. Hawley:

"I think your suggested terminology for Chaco masonry types as described in the current issue of American Antiquity is a step in the right direction. Perhaps the data as presented leaves no room for further classifiable postulation. It is clear, precise, without parochial inference. Abstracting from the merits of your definitions though, some of them are predicated upon negative descriptive matter, which in the builder's art, is considered taboo. Therefore, forgetting archaeology for the moment, here is how these masonry types would be described, using the builder's language:

"1. Crude Rubble without Core.	1. Crude rubble.
2. Fine Unbanded with Core.	2. Fine random stone veneered rubble.
3. Spalled Blocks with Core.	3. Spalled random stone veneered rubble.
4. Inferior Wide Banded with Core.	4. Inferior wide banded stone veneered rubble.
5. Fine Wide Banded with Core.	5. Fine wide banded stone veneered rubble.
6. Unfaced Slab.	6. Random natural stone slab masonry.
7. Small Spalled Blocks without Core.	7. Small spalled stone masonry.
8. Slab Base Rubble.	8. Rubble with exposed stone slab foundation.
9. Slab lined Pit House.	9. Stone slab lined pit house.

"I don't think it necessary however, to conform to architectural nomenclature in archaeology, although at times one runs across terms so utterly ambiguous that even an architect or engineer is at a loss to know what is meant. Sometimes the graphical architectural data as published is even worse.

"In this particular case your own definitions, it seems to me, are possibly more appropriate than the suggested alternates.

Very truly yours,

(Signed) Ross MONTGOMERY." (Architect,
3828 Amesbury Road,
Los Angeles, California)

TREE-RING CHRONOLOGY IN THE SOUTHEAST

I have recently learned that back in 1914, or about that time, there was a lawsuit in Louisiana to get title to the oil rights under Caddo Lake near Shreveport. The geologist employed by the group which claimed title under the assumption that Caddo Lake is a lake, and not a navigable stream under federal jurisdiction, won their suit by establishing the age of the lake as being around 3,000 years. This age, I am told, they established through a study of tree rings of logs taken from the bed of the lake and from ancient log jams on the nearby Red River.

If it is true that these geologists worked up a tree ring calendar for northern Louisiana, reaching back 3,000 years, it should be of great interest to archaeologists. I am unable as yet to learn the title of the suit, but the United States Government and numerous oil companies were parties to it, and it was a very large suit for its time.

In this connection, geologically, Caddo Lake should afford a tree ring calendar reaching back to the beginning of the lake proper, for even now it is so studded with dead trees killed by impounded water that most people think it to be an artificial and not a natural lake. While I personally disagree with the theory that a log jam on Red River was a primary cause for the damming of this lake, and credit its origin to earthquakes which caused the jam, since there is evidence of recent faulting, the logs in this old lake bed and nearby river jams should reach back several hundred, if not thousands of years.

FRANK BRYAN
Seaboard Oil Corporation
Dallas, Texas

CHACO CANYON MASONRY

In order that certain errors in the Florence Hawley article on *The Family Tree of Chaco Canyon Masonry* (AMERICAN ANTIQUITY, Vol. 3, No. 3, January, 1938, pp. 247–255), may not become too strongly fixed in the minds of students of Southwestern archaeology, it is advisable to call attention to them at this time. In the diagram on page 250, No. 1 in the chart, the slab masonry is listed as Basket Maker III with the date 777 plus or minus, and on page 254 the discussion refers to Judd's pit house with the 777 plus or minus date as being Bas-

ket Maker III. The date was that obtained by Douglass, and in his table,[26] to which the author referred in her article, there was nothing to indicate that the pit house in question was Judd's No. 2. The latter was not Basket Maker III but fully developed Pueblo I. Judd's report on this house and the published pictures of the pottery and other objects found in the structure clearly indicate that it belongs to the Pueblo I period.[27] It is important that the 777 date be recognized as definite Pueblo I and not Basket Maker III, because there has been a tendency to regard Basket Maker III in the Chaco as of later date than is warranted by the evidence, and as a consequence certain comparisons made in some reports have been misleading. The problem of the interplay of influences and reciprocal diffusions is sufficiently difficult to solve without the added complication of incorrect correlation between dates and cultural horizons.

Another correction concerns the second form of masonry, Slab Base Rubble, No. 2 in the chart, page 250, which is listed as Pueblo I, 850–900 A.D. The type also occurred in Basket Maker III in the village, near the eastern end of the canyon, excavated by the writer in the summer of 1927.[28] These examples demonstrate that the type originated in Basket Maker III, although the culmination may well have been in Pueblo I. The sequence given in the Hawley article is probably correct, but both types belong in both Basket Maker III and Pueblo I, and the Slab Base Rubble certainly antedates 777 A.D.

FRANK H. H. ROBERTS, JR.
Bureau of American Ethnology
Washington, D. C.

(EDITORIAL NOTE: Mr. Gordon C. Baldwin, in a letter received immediately subsequent to that of Roberts, has pointed out these same "errors" in the Hawley article. Due to the similar subject matter and treatment characterizing these two criticisms, and in consideration of the limited space in the journal, it was thought best to publish only the one first submitted.)

INACCURATE REFERENCES

In the interest of accuracy I wish to point out some errors in the last October issue of AMERICAN ANTIQUITY. I am mostly objecting to these errors as instances of an unhistorical manner of writing that goes poorly with the work of archaeologists.

The second article of the *Symposium on Certain Problems in Culture Origin*, written by Vladimir J. Fewkes, lists two books by J. D. Hunter: *Manners and*

[26] Douglass, A. E., Dating Pueblo Bonito and Other Ruins of the Southwest, National Geographic Society, contributed technical papers, Pueblo Bonito Series, No. 1, Washington, 1935, p. 51 (Pit House in Wash).

[27] Judd, N. M., Two Chaco Canyon Pit Houses, Smithsonian Report for 1922, Washington, 1924, pp. 399–413.

[28] Roberts, F. H. H., Jr., Shabik'eshchee Village, Bull. 92, Bureau of American Ethnology, Washington, 1929, pp. 15, 31; pls. 2a, 5a.

Customs of Several Indian Tribes and *Memoirs of a Captivity among the Indians of North America*, printed in 1823 and 1824, respectively, in Philadelphia. I can trace no edition for 1824 in this country. There were, however, in London three editions of *Manners . . .* bearing the title: *Memoirs of a Captivity. . . .* I repeat, the London editions were the same as the original American one, with the addition of some material purporting to vouch for the veracity of the author, and a title calculated to make the book more popular in England.

Source material should be examined personally and critically evaluated. Citing a small bit here and there is as apt to be dangerous or useless as taking a drug in defiance of instructions to "shake well before using." I will not go into the authenticity of Hunter's material, but if you do not question it after reading the entire book, I would suggest that you read its contemporary review by Lewis Cass.[29]

In this case, if Fewkes had read the work he was citing he would not have even intimated that the molding of vessels over wood blocks was practiced by the Kickapoo. On page 221 of the 1823 Philadelphia edition, Hunter qualified his account thus: "What remains to be said of the Indians, relates more particularly to the Osages, although it will apply with almost as much propriety to the Kansas, Mahas, and Ottowas [sic. Otos]." Possibly also he would not have given Hunter as the authority for his statement that such molding was also done "over a basket (?) or perhaps a contraption made of twigs especially for the purpose," for the words of Hunter were as follows:

"Another method practised by them, is, to coat the inner surface of baskets made of rushes or willows, with clay, to any required thickness, and when dry, to burn them as above described." (*Manners and Customs of Several Indian Tribes* (Philadelphia, J. Maxwell, 1823, p. 297).)

VERNON KINIETZ
Research Associate in Ethno-history
University of Michigan

THE PURCHASE OF ARCHAEOLOGICAL MATERIAL

The recent publication of an article advising travelers in the out-of-doors to keep their eyes open for archaeological specimens and natural history specimens which might be sold to museums or collectors as a means of increasing income makes it not untimely for us to state our position in regard to the purchase of archaeological material.

Collecting artifacts with no regard for their situation and association is analogous to tearing pages out of books. Unscrupulous collectors with an eye for monetary gains have been guilty of the worst types of vandalism. It goes without saying that most archaeologists are not as interested in artifacts that have been robbed of their setting as they are in artifacts that have been preserved along with all the associated information. To suggest at this time that a

[29] North Amer. Rev., 22: 94–107, Jan., 1826.

ready sale for any or all archaeological material may be found at museums seems rather unfortunate.

Our present policy here at Andover is not to purchase relics indiscriminately. Should any of our friends bring in important specimens that they have purchased in order to preserve them, we are always glad to repay them any expenses that they may have incurred. We do not feel justified in buying any specimen that may turn up without finding out whether it meets our requirements. It must fall into one of the following classes:

1. Artifacts turned up by accident, such as by agricultural undertakings or construction work.
2. Artifacts acquired by an individual desiring to preserve them from inevitable destruction or loss.
3. Artifacts supported by reliable information as to provenience and manner of occurrence.

We very definitely refuse to purchase artifacts that have been rooted out of the ground with the express intention of selling them, or without regard for the surrounding circumstances. We furthermore reserve the right to refuse to accept gifts of artifacts that are not supported by satisfactory records.

It has been our policy to aid fellow students of archaeology in every possible way, and to share with others the knowledge and information that we have acquired. We will do all in our power to help those who are earnestly interested in perfecting their methods of keeping records, or of securing information, but we will not stir a finger tip for those who are motivated by greed or commercial instincts.

DOUGLAS S. BYERS and
FREDERICK JOHNSON
Phillips Academy
Andover, Massachusetts

LITHIC PROBLEMS

In every science the matter of nomenclature is a basic stumbling block which must be surmounted in order that ideas and accomplishments of any may be interpreted and correlated by all.

In the Lithic Laboratory for the Eastern United States, we have found it necessary to take certain steps toward uniformity in order that we may effectually achieve our ultimate aim of correlation between the primitive implements which are discovered and the occurrence of the outcrops from which the material was procured by the aborigines.

Since numerous errors in the identification of lithic materials have been made in archaeological papers in the past, as most will admit, the work of these writers is nugatory as far as the Lithic Laboratory is concerned unless these particular specimens are available for our own identification.

A fairly accurate study of the works of thirty-five of the foremost geolo-

gists, petrologists, and mineralogists discloses a definite splitting into at least six groups over the question of a distinction between flint and chert. Hence, one scarcely wonders at the inability of the archaeologists to make mineral identifications.

However, in an attempt to bring some semblance of uniformity into the nomenclature where it will apply in studies of the Lithic Laboratory, and since it is apparent that the aforementioned geologists, petrologists, and mineralogists have not reached a satisfactory agreement, we will refer to James Dwight Dana as our authority in making definite and specific identifications; but for a general term to include such widely used and closely allied siliceous materials as chert, hornstone, basanite, pthanite, touchstone, Lydianite, silex, novaculite, jasper, et cetera, "flint" will be employed, since we feel that it is a term more generally known and with a more distinct meaning for the average person than any other of the more or less synonymous terms expressed above.

We sincerely appreciate the whole-hearted cooperation which has been accorded the Lithic Laboratory since its inception and would welcome any suggestions on this matter of nomenclature or other subjects pertinent to our work.

H. Holmes Ellis
Research Associate
Lithic Laboratory
March 1 1938

NOTES AND NEWS

Arctic Area

Dr. Froelich G. Rainey, of the University of Alaska, sends the following statement concerning his 1937 investigations:

"During part of May and June I continued investigations in the Tanana valley for the University of Alaska and the American Museum of Natural History excavating a village site known as Dixthada on Mansfield Creek near Tanana crossing. Four small refuse middens located near house pits or depressions, ten of which appear at the site, were removed and proved to contain a series of bone, horn, stone and native-copper implements but no pottery of any kind. The refuse middens vary in age but it is known that the youngest were deposited by ancestors of the present natives, and it is relatively certain that all may be referred to people of the northern Athapascan stock.

"In July, accompanied by Dr. Raymond Murray of Notre Dame University, I continued excavations of fire pits on the right and left limits of the Yukon River just below the Rampart Rapids, 35 miles above the mouth of the Tanana, to find that some contained sherds of very crude pottery while others on the opposite bank and below contained flint and obsidian implements and chips, but no pottery.

"During August and part of September we continued excavations at Kukulik on St. Lawrence Island, completing a second cut through the midden in an attempt to check our earlier stratigraphic information and to obtain more ample collections from the lower and older deposits.

"Incidentally, a few more implements have been turned up in the dredging operations near Fairbanks, all of which were said to be found in association with extinct animal bones at considerable depth." (*H.B.C.*)

Erik Holtved, of the National Museum of Denmark, who has spent the past two years at Smith Sound in northeastern Greenland, has returned to Copenhagen with an extensive collection of archaeological material which he excavated at old Eskimo sites in that region. Mr. Holtved's investigations have provided valuable information regarding the earlier stages of Eskimo culture in Greenland and particularly of the local relationship between the Thule and Dorset cultures. Included among the finds were chessmen and checkers carved from whale bone, indicating that Norse influence from south Greenland had extended farther north than previously had been supposed. (*H.B.C.*)

Diamond Jenness will represent the National Museum of Canada, and Henry B. Collins, Jr., the Smithsonian Institution, at the Second International Congress of Anthropological and Ethnological Sciences, to be held in Copenhagen, August 1st to 6th. (*H.B.C.*)

The POLAR RECORD for January, 1938, gives the following summary of Dr. Aage Roussel's recent investigations of mediaeval Norse remains in Greenland:

"During the past few years, systematic investigations of the Norse remains in Greenland have been carried out under the general supervision of the Danish Committee of Scientific Research, and led by Dr. Aage Roussel. An expedition in continuation of this work visited the Godthaab district of West Greenland in the summer of 1937, leaving Copenhagen in May, and consisting of five scientists under the leadership of Dr. Aage Roussel as before. The party first visited Ameralik Fjord, where two large farm sites had been excavated in 1930 and 1934, and then proceeded to the Austmanna valley . . . In the valley a number of large farm sites had been discovered in 1934, and these when investigated proved to be of great interest. They are believed to date from the golden age of the Norse colonies in Greenland, and not, as formerly supposed, from the later period when the Eskimo had begun to arrive in the fjords, and the power of the Norsemen was waning. It had been suggested previously that the position of this isolated settlement, of which the most distant farm was 30 km. from the fjords, and only one hour's walk from the edge of the ice-cap, seemed to denote retirement inland as a result of encroachments of the Eskimo.

"The largest farm site consisted of twenty-two rooms, and many articles found buried make it possible to reconstruct with great accuracy the mode of life followed in a Norse farm of the period." (*H.B.C.*)

Southwestern Area

Dr. Paul S. Martin, who during the past ten years has directed excavations at the Lowry ruin and various associated unit-type houses in southwestern Colorado, contributes the following report on the Field Museum Expedition to Colorado in 1937. Previous work in this area had produced data relating to a period from about A.D. 950 to 1100; it was an important purpose of this expedition to obtain clues concerning the earlier history of the region.

"An intensive survey of the Ackmen-Lowry area was undertaken by assistant Carl T. Lloyd. The first three weeks were entirely devoted to this task. Later, the work was done intermittently. In order to obtain significant data which would be handled quantitatively and which could be fairly compared, Lloyd felt that it was important to do two things: (1) to cover practically every square foot of ground in the area being examined, collecting 100 sherds from every ruin; and (2) to work equal land areas. If these two rules were carried out, one would make the survey objective by ignoring the unproven idea that the Indians preferred certain topograpnic features for their habitations. Furthermore, by surveying equal areas of land in each section of a township, one would obtain data which could be handled quantitatively, and could, by all the rules of the game, be fairly compared, since in every case equal units would be under consideration. Lack of funds and time made it impossible to survey complete township sections. Therefore, the northwest and the southeast quarters of every surveyed section were carefully done. In this

way 16¼ square miles in the Ackmen-Lowry region were carefully examined and 180 sites were thus discovered.

"At the end of the season Lloyd wrote a report of his work, which will be published as part of mine.

"I do not have sufficient time to give a summary of all his results, but will give one or two. Mr. Lloyd analyzed pottery and associated house types from 78 sites. Four phases, the definition of which excluded spatial and temporal considerations, were established. These phases were compared with the phases from Lowry ruin, and it was found that each checked with the other.

"After three weeks were expended on survey work, some excavations were started on what appeared to be Pueblo I or II sites. Each site was staked out in two-meter squares. Digging was done by squares and by levels, each level being 20 centimeters deep. Mr. Alex Spoehr, my other assistant, was in charge of the mapping and excavations.

"Site 1 consisted of a slab structure and an associated kiva or pit house. There was no way of telling whether the pit-structure was used for ceremonies or for habitation, or for both functions. The roof was supported by four posts set in the floor. A low bench encircled a part of the outer zone. A sipapu, rectangular firepit, and a ventilator were discovered. No deflector was observed.

"The slab structure was only about 7 feet wide, and may have been used for storage purposes. On top of some of the slabs, fragments of masonry were found.

"The predominant pottery types of Site 1, listed in the descending order of their occurrence, are as follows: A. indeterminate painted pottery, B. smooth culinary, C. plain Basket Maker III pottery similar to Lino gray, D. plain corrugated, E. flat wavy indented corrugated, F. a sprinkling of Mancos black-on-white pottery.

"Just north of the slab-house, a number of post holes were discovered. These were used for holding posts which may have formed a lean-to. The pottery from within this structure was the same as that found in the slab building.

"Site 1 may possibly be classified as Pueblo I or developmental Pueblo.

"Site 2 included a kiva and two surface rooms. The kiva contained a masonry banquette, on which were crude stone pilasters. The walls above the banquette were of dirt. No sipapu or deflector was noted.

"The walls of the above-ground rooms were of exceedingly crude horizontal masonry. The stones were of all sizes and were not cut, shaped, or trimmed in any manner. I cannot state definitely whether or not these rooms were used for habitation. They were large enough certainly.

"The predominant pottery types of Site 2, listed in descending order of their occurrence, are as follows: A. indeterminate painted pottery, B. flat wavy indented corrugated, C. Mancos black-on-white pottery, D. smooth culinary.

"Site 3, which appeared more like an early unit-type Pueblo, consisted of a four-room Pueblo and probably two kivas. One kiva was excavated. It was "primitive" in some ways, for the walls were of earth and a bench was lacking; but on the south was a typical southern recess which was so common in later unit-type and Mesa Verde kivas. The roof was supported by four posts. A deflector in the normal position was noted, but no sipapu. The walls of the ground-level rooms were composed of horizontal masonry and were the best ones found during the season. It is possible that these rooms were lived in.

"The predominant pottery types of Site 3, listed in descending order of their occurrence, are as follows: A. indeterminate painted pottery, B. flat wavy indented corrugated, C. Mancos black-on-white, D. medium wavy corrugated, E. plain corrugated.

"Site 4 represented a culture probably older than any other found during the season. The complex comprised two unconnected jacal structures and a house-kiva. The latter was more or less round. During the first occupation the roof had been supported by five posts. No deflector or sipapu were noted. This kiva was later enlarged and a mud bench, on which were placed six masonry pilasters, and some masonry in the wall around the ventilator tunnel were added. At the same time, the size of the ventilator opening was reduced.

"The walls of the above-ground structures were of mud and posts. A very hot fire later destroyed these buildings. The pottery and sherds found lay under large chunks of burned adobe and were somewhat affected by the heat.

"The predominant pottery types of Site 4, listed in descending order of their occurrence, are as follows: A. plain Basket Maker III pottery similar to Lino gray, B. indeterminate, C. flat wavy indented corrugated, D. medium wavy indented corrugated, E. Mancos black-on-white, F. smooth culinary.

"A full report on this work will be published by Field Museum within the next four or five months." (*E.W.H.*)

Work at Dragoon, Arizona, in the Texas Canyon District, during the past three seasons has disclosed several new features and confirmed others, according to a report from Mr. W. S. Fulton.

Among the structural items unearthed, four pit houses have been located. These are similar in type to those previously found here; i.e., small (9 feet 1 inch to 11 feet 6 inches in width by 11 feet 3 inches to 14 feet 6 inches in length), with rounded corners, adobe-plastered walls 15 to 17 inches high, no ramp entrance, no post holes in any house, and no fire boxes except in one floor level from which no walls could be traced.

The axe is the most important artifact found here. It is of the three-quarter-grooved type with high ridges, and nearly always has a longitudinal groove, extending in one case the entire length of the tool from the mallet head to the tip of the bit.

Vessels of various sizes and shapes (bowls, dishes, ollas, elongated vessels, dippers, and seed bowls), both decorated red-on-buff and plain ware, are

found in whole or fragmentary condition. Figurines of clay and stone, shell and stone ornaments, clay beads, and other miscellaneous items are found in considerable numbers. Articles of bone are mostly of two sorts: punches or awls and hafts.

It was formerly thought that the burials were almost exclusively of the normal or extended type, but as work progresses the number of cremations has so largely increased that to date the two methods are numerically about the same. In the burial of the calcined bones within the urns or bowls, the practice seems to have been to locate the pit outside the surface sherd area.

Work on a site near Gleeson, Cochise County, Arizona, at which Red-on-Buff pottery is found, is now under way, and while a great deal of dirt has not as yet been moved, results thus far are very encouraging. One large and two small pit houses have been cleared, and two roasting pits of the so-called "Trischka" type have been found. On the floor levels and in the general fill are fragments of shell ornaments, bits of turquoise, a corner of an arched pallette, figurines (mostly broken) of animals and women—one a hunchback and another in pregnant condition, bone awls, and some arrow and drill points. Only one whole red-on-buff bowl, similar to those found at Texas Canyon, and two plain ware ollas have come to light. Sherds indicate a Hohokam culture, with variants, but more work must be done in order to properly classify the site culturally. (*E.W.H.*)

We have word from Miss Isabel Kelly that a village site six miles north of Tucson is being excavated for Gila Pueblo by Mr. and Mrs. Wetmore Hodges and Miss Kelly. Ceramically, the material is an interesting blend of Hohokam and Mogollon, with definite Gila Basin parallels in design and shape, but with Mogollon affiliations in ware and polish. Contemporaneity with the Snaketown to Soho phases of the Gila Basin (estimated at 300–1300 A.D.) is relatively well established. Sherds indistinguishable from the Estrella and Sweetwater phases of the north indicate earlier occupation, although so far these earlier wares have been found sporadically and are numerically insignificant. (*E.W.H.*)

Mr. Charles Amsden reports, for the Southwest Museum, that Mr. M. R. Harrington has been granted a modest sum by the Carnegie Institution of Washington for a reconnaissance in northern California to locate sites of early man, particularly to run down the occurrence of some very Folsom-like points that have been brought in to the Museum.

Mr. Amsden is at work on a semi-popular book on the prehistoric Southwest. It is planned as a chronologic narrative treatment of principal cultures, of about the same scope and style as his book: *Navaho Weaving*. (*E.W.H.*)

The Museum of Northern Arizona is making an archaeological survey of northwestern Arizona, with Mr. Lyndon L. Hargrave in charge. Plans for excavating two sites in the neighborhood of Flagstaff during the summer are under

way. This project involves a further investigation of the culture represented at Winona Village. It is hoped new evidence will be produced bearing on the origin of certain polychrome pottery wares which later play such an important part in the Tsegi. (*E.W.H.*)

For many years Superintendent Frank Pinkley of the National Park Service, Southwestern Monuments office, has emphasized the crying need for a comprehensive, long-term program of ruins stabilization in the area administered by the Southwestern Monuments office, National Park Service.

Beginning in January, 1937, a series of arrangements culminated in the establishment late in June, 1937, of a cooperative project between the National Park Service CCC and the Indian Service CCC, the former to furnish supervisory personnel, automotive equipment, and tools, and the latter supplying enrollees, the camp, and subsistence. The personnel consists of twenty-five Indian enrollees, an archaeologist foreman, and an engineering foreman. The archaeologist, Gordon Vivian, is chief of party. The unit is mobile in the sense that it can be shifted from monument to monument as needs arise, but ordinarily it will stay at a monument during favorable weather conditions until pressing work is exhausted.

The crew has been working intensively on Pueblo Bonito in Chaco Canyon National Monument, New Mexico, creating effective drainage, strengthening foundations, capping walls, and placing inconspicuous bracings where needed. Emergency repairs are effected on other Chaco Canyon ruins when needed.

Thus far about thirty rooms and kivas have received attention. The unit has capped walls, corrected drainage, and repaired foundations and masonry. The enormity of the task on Pueblo Bonito alone can be visualized when it is realized that the unit, if it confined its efforts to wall capping alone, would work on this ruin for three years. There are 17 major ruins in the Chaco Canyon alone, to say nothing of the hundreds of ruins in other national monuments under Mr. Pinkley's office.

Full notes and photographic records are kept of the work, and copies of reports will be filed with Chaco Canyon National Monument, the Southwestern Monuments Loan Library, the Washington office of the National Park Service, and the Bureau of American Ethnology. Ground plans and profile drawings are executed according to standards of the Historic American Building Survey. The crew confines its activities entirely to stabilization and repair; no restoration is contemplated.

Various new methods are being tried out, particularly the use of Bitumuls Stabilizer in wall capping and pointing, and it is hoped the crew will perfect and standardize ruins-stabilization techniques.

Funds are assured only until July 1, 1938, but it is hoped that additional allotments will enable the work to continue.

During 1937, Room No. 7 of the Wupatki Pueblo, partially excavated under a CWA program, was washed by rains so badly that it was feared sherds of

restorable pottery vessels were being lost. Accordingly, Assistant Archaeologist Erik K. Reed in October and November was assigned to trowel out the room. He was assisted by Ranger J. W. Brewer, Jr. More than thirteen restorable vessels were discovered, as well as several burials. Artifacts and skeletal material were catalogued and placed for safe-keeping in the Museum of Northern Arizona until such time as the museum at Wupatki will allow such materials to be protected and displayed properly. Mr. Reed, during the latter part of 1937 and the first months of 1938, worked at the Museum of Northern Arizona on his final report of the excavation. It is hoped that this excavation report will be published, probably by the newly formed Southwestern Monuments Association, in the near future.

In October, 1936, Custodian Zeke Johnson, of Natural Bridges National Monument, Utah, climbed on a sunny ledge near the trail between the Sipapu and Kachina bridges and discovered an unknown group of ruins, past which he had been walking for twenty years. They consisted of two kivas, one with the original ladder in place, storage rooms, and five houses all in an excellent state of preservation.

April 16 to 23, 1937, Junior Archaeologist Charlie R. Steen cleaned the two kivas and one of the storage rooms to prepare the site for visitors. Entrance is by a ladder which is dismantled and hidden when the monument is left unprotected, due to lack of funds for custodial personnel. Steen summarized his work in Southwestern Monuments Special Report No. 17: *Archaeological Investigations at Natural Bridges*, Supplement to the Southwestern Monuments Monthy Report for May, 1937. (*D. S. King.*)

The Arizona Anthropological Association has been formed in Phoenix "for the purpose of sponsoring anthropological research and for the dissemination of any knowledge which might accrue from such research." The officers of the newly incorporated association are Odd S. Halseth, President; Dr. R. E. Solosth, Chairman of the Executive Board; and Thora Rollins, Secretary. Serving as an advisory board are:*Anthropology*—Dr. Donald D. Brand, Dr. Emil W. Haury, Dr. Frederick W. Hodge, and Mr. Malcolm J. Rogers; *Ethno-Botany*—Dr. Paul Burgess, and Dr. Forest Shreve; *Public relations*—Mr. Amos Betts, Mr. Walter Bimson, Dr. Grady Gammage, Dr. Herman Hendrix, Mr. Mulford Windsor, and Hon. Henry D. Ross.

Headquarters of the association is the Pueblo Grande Laboratory. The Association already has considerable assets, and plans are under way for the sponsoring of a major field project. This project will include both physical and and social anthropology, as well as linguistic and ethno-botanical studies. (*E.W.H.*)

Dr. Emil W. Haury of the Department of Anthropology, University of Arizona, has been appointed Director of the Arizona State Museum, effective July 1.

Southeastern Area

The following is a summary of a recent report, for the month of February, on the work being conducted at Irene Mound, situated on the western bluff of the Savannah River near Savannah, Georgia. Research here is being conducted as a WPA work project, sponsored by the Savannah Chamber of Commerce, under the personal direction of Dr. Vladimir J. Fewkes.

As the result of the necessity to check all previous records, following Fewkes' assumption to duties, in addition to the surveying of important adjacent areas, little headway was made in expanding excavation proper until the second half of the month. It was deemed initially important to gain a thorough understanding of the site and of the correct procedure of its investigation.

The mound has been shown by means of profiling to consist of three successively superimposed mantles: I, II and III in the chronological order of their deposition. These collectively rest upon a pre-mound deposit, Layer X, which contains culture detritus. The total thickness of the three mantles is 15½ feet.

Mantle III, where undisturbed, appears to consist of a sand zone (of mixed light and dark materials suggesting "basket loading," shell, charcoal, and Lamar sherds), over a well defined layer of shell mixed with potsherds and other cultural material. The portion of Mantle II revealed by the excavations consists of a "basket-load" accumulation of sand and clay. The lower plane of this mantle is superimposed upon a thin humus-like layer, constituting a clear line of demarcation between mantles II and I. Mantle II contains quantities of broken shell, charcoal, and potsherds chiefly of the cord-marked variety. The upper portion of Mantle I is constructed by "basket loading," while the lower portion has been described as "debris-fill." This formation contains a profuse admixture of soil, shell, and potsherds representing a ceramic variety that has been called the "Savannah complicated-stamped" ware.

Little pottery has been found in Layer X, probably due to limited excavation. Even so, however, the sherds appear to comprise virtually all of the several classificatory groups conceived by Mr. Holder, previously in charge of the work.

Some post molds have been found on the summit of Mantle I. Of two partially exposed areas of post-mold concentration, one suggests a circular and the other a rectangular arrangement. Mantles II and III have failed to reveal indisputable evidence of post molds to date, although post molds present in Layer X appear to penetrate upwards into the "debris-fill" of Layer I. These molds suggest something like remnants of straight walls.

South of the southeastern quarter of the mound, there is a considerable concentration of fired daubing, often with pronounced impressions of wattling, in association with potsherds and other cultural remains. As yet there are no positive traces of floors or dwelling outlines, although the daubing suggests a

plastering medium applied over wattled walls, preserved through accidental firing.

From the work thus far accomplished, it is possible to grasp, at least roughly, the tectonic nature of the three-in-one mound. However, pending further exploration, no definite deductions can be made as to the probable aboriginal purpose of any of the three mantles, and a conclusive understanding and interpretation of the mound's cultural history remains to be determined.

The so-called "burial mound" at this site appears to be a natural rise of ground, preferably described as a cemetery. The burial pits are sufficiently well defined to render it entirely plausible to follow the walls of a pit from its initial appearance down to the bottom, and thus to arrive at an understanding of the depositional relationship of a grave with related stratigraphy. (*V. J. Fewkes.*)

Early Man in America

A deeply buried site in an old stream terrace, located in Smith County, Kansas, has been under investigation and study by Dr. Loren Eiseley, anthropologist of the University of Kansas. Fragmentary faunal remains, artifacts and other cultural detritus suggest an early non-Folsom, non-agricultural horizon. It is hoped that the study of the terraces may yield an approximate dating of some value for this region. The find appears to be the oldest reported from Kansas since the early discovery of a dart point, associated with *B. occidentalis*, which was reported from Wallace County many years ago by Williston. Dr. H. T. U. Smith of the Department of Geology is engaged in a study of the geomorphic changes which have taken place in the region, and will collaborate with Dr. Eiseley upon the final report. (*L. Eiseley.*)

BOOK REVIEWS

The American Indian, 3rd edition. CLARK WISSLER. (Oxford University Press, 1938. $3.75.)

This book needs no introduction to anthropologists. Since its first appearance in 1917, it has been a standard work on all aspects of anthropological knowledge regarding the two Americas; the only book which summarized the the results of specialized researches in the various divisions of this science in such concise and simple terms as to make them available even to the layman. The steady accumulation of knowledge necessitated a first revision in 1922, and the present edition brings the book once more up to date. A comparison of these three editions shows simply and graphically not only the growth of our knowledge of aboriginal America but also the changes in research technique and the areas which have been intensively studied or neglected during the last twenty years.

The first thing which will strike the person who makes such a comparison is the relatively rapid progress of archaeological research as contrasted with that along other lines. The present edition shows changes in all its sections, but in no other have they been as extensive or as far reaching in their implications. In the treatment of the archaeological material, the regional classification is still adhered to, but the only North American regional descriptions which have not been extensively revised are those dealing with the Columbia Basin, North Pacific Area, and Interior Canada. This is simply an indication that these areas have been neglected by archaeologists.

The wealth of material which may actually exist here is indicated by the contrast between the description of Plains archaeology as it was known even in 1922 and as it is known today. Even fifteen years ago the Plains were regarded as a barren area yielding only a few traces of low cultures. In the present edition the accounts of this area and of the Pueblo area are the ones which have been most extensively revised.

The increase in our knowledge of the Southwest is almost as striking as that for the Plains, and shows what can be done by a concentrated attack on the problems of any particular region. In this connection there is a section on tree-ring dating and a Southwestern chronology which will be of great interest.

The new edition also reveals the tremendous increase in our knowledge of early man in America. That he was a contemporary of various large extinct mammals is now established beyond question, but the variety of the cultures for which such associations have been established suggests that there must be some older cultural stratum which is still undiscovered. Incidentally, the fact that none of the new finds have necessitated any extensive revision of the author's previous conclusions as to the probable time of man's migration to America or his general cultural equipment when he arrived shows the soundness of the methods used in the earlier historic reconstructions.

In contrast with the archaeological material, the ethnological sections show

little revision. Indian tribal cultures have been destroyed so completely that the gleanings of even the last twenty years have produced nothing of great significance. The work on Indian languages which has been done during the same period has produced some significant results, and it seems to the reviewer that it is here, if anywhere, that the author has been over-conservative. Sapir's recent six-fold classification of North American languages would seem to have deserved mention even though disagreement on certain points was registered. The section on somatic classification includes new data, but here again there has been no need to modify earlier conclusions as to the Indian's racial affiliations.

The book as a whole is as indispensable to students of American anthropology as were its predecessors.

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A Prehistoric Fortified Village Site at Canandaigua, Ontario County, New York. WILLIAM A. RITCHIE. (Research Records of the Rochester Museum of Arts and Sciences, No. 3, Rochester, N. Y. 1936.)

During the field season of 1934, Mr. Ritchie and his competent assistants excavated the Canandaigua Site in Ontario County, New York. The publication of this work contributes many important details to our knowledge of the Owasco Aspect of the Woodland Pattern as it is expressed in the Canandaigua Focus. A number of excellent plates illustrate the types of artifacts found on the site. Also, certain characteristics of the deposits can be seen in a number of very fine reproductions of photographs. Diagrams, a folding map, and two charts further elucidate the complex situations which were uncovered during the excavation.

The most striking feature of the site is a system of ditches. These had been dug on a "gently east and northeast sloping hillside" presumably for purposes of fortification. Complete excavation of some of the ditches, and tracing the extent of others by test-pitting, revealed this system which, from a European point of view, anyway, makes very little sense. The author's attempt at explanation of the arrangement is more or less a rationalization of the inadequate facts combined with justifiable suppositions and assumptions having to do with changes in living conditions. The explanation is unsatisfactory but, one should hasten to add, only because the available facts are not at all definitive.

The ditches had been partially or, in rare instances, completely filled during the occupation of the site. The various levels in the fill present a complicated stratification, all the characteristics of which are difficult to understand even after a study of the published vertical sections found in Ditch 1. A more complete understanding of the situation might perhaps have been obtained

if a longitudinal, vertical cross section had been added. The development of the fill during the occupation of the site is obvious, but apparently little more can be said. The layers, which with some exceptions appear to alternate, should indicate something in the way of development, but because of the character of the site no evidence of growth was obtainable. Because the types of artifacts discovered in the several strata are similar, it appears to be impossible to separate the layers on the basis of culture content. One would expect that the ditches had been dug at different times, and the author has brought this out in so far as it is possible. Because there is so much similarity in the deposits filling the various ditches, nothing truly convincing can be said concerning their chronological relationship. This situation is characteristic of many deposits in the Northeast, and we can do nothing but hope that future detailed analyses, not only of culture content but also of minutiae in the ground, will eventually develop criteria for determining valid chronological sequences.

Eleven pits, four "fire beds," and forty-five hearths are mentioned in some detail. The pits frequently contained ash, shells, charcoal-stained earth, black earth, or charcoal-stained deposits. A few of them were stratified and all of them showed evidence of fire in one way or another. Representatives of almost every class of artifact were found in the pits. Frequently the artifacts were found in the charcoal-bearing or shell deposits, but many exceptions make such a generalization inadequate.

The "fire beds" are really hearths that are too large for the usual domestic purposes. The supposition that these were the location of smudges for smoking meat or fish seems logical enough. If these were used in this way there would have been, theoretically anyway, a stage to support the food to be cured. Molds of posts which might have supported such a stage were not discovered.

The hearths are described in general as "simple structures of small size, differing in no important respects from those found on practically all Indian sites" (p. 37). An analysis of the details indicates that these hearths were the remains of small cooking fires built in small shallow pits. Interestingly enough, a lump of iron pyrites and a thick flake of flint, believed to be a fire-making set, were found in one hearth.

The subsoil in two parts of the site was uncovered in order to discover the presence of post-molds. The arrangement of a large number of these indicated certainly that houses were built with a circular plan. The author says (p. 41), "Only a few linear and circular assemblages could here and there be traced either in whole or in part and these are depicted on the map." The circular arrangements are very plain indeed, but linear arrangements are by no means as clear. The one, or possibly two lines of post-molds which can be made out on the map do not have parallel lines of molds which could have originated from opposing walls. Neither are there lines of post-molds which could have been the remains of intersecting walls. In summing up his remarks on the houses, the author has said (p. 43), " . . . and the likelihood is great that both the small dome-shaped house, similar to that of the Shinnecock, Narragansett,

and other southern New England, Hudson River, and Long Island Algonkin tribes, was in use, together with a long-house type generally resembling that of the Iroquois, such as the Canarsie, Lenape, and other eastern Algonkins are known to have erected. On this site, as well as at Castle Creek and Levanna, rectilinear series of post-molds were traceable in part, but no complete floor plan could be ascertained." In using linear arrangements of post-molds as a basis for saying that "the likelihood is great" that long-houses were erected by the inhabitants of the site, the author appears to be inferring more than is justified by the published facts. If the possibility of the presence of long-houses had been suggested with more caution, there would be no question as to the status of our knowledge concerning house types at this site. More careful editing would have clarified the unfortunate construction in the last part of the next to the last sentence of the quotation where, upon first reading, one gathers that the Canarsie and the rest belong with the Iroquois.

Fifty-seven burials were uncovered in two cemeteries. A large scale chart of each cemetery and an excellent table listing the important characteristics of the graves clearly summarize all of the important features of the burials. The burials are also excellently described, thus presenting all of the interesting and necessary details. There are, however, in this description certain statements which might be termed somewhat rash. Only barely worth mentioning is the statement (p. 55), " . . . while in one case, probably that of an infant, no trace whatever endured." In order to say that the burial was probably an infant there must have been some trace, otherwise no burial could have been identified at all. In saying that the bodies of the victims were standing upright while being shot full of arrows, "probably fastened to a post or a tree of small diameter" (p. 61), the author may have carried his interpretation a little too far. The mere position of the arrowheads in the body cavity and some of the bones is hardly a sound basis for a statement of probability. The arrowheads not held in the bone may have moved during the decomposition of the corpse. This is especially true in view of the lack of supplementary information concerning the presence or absence of posts to which victims were tied, to say nothing of the existence of some such custom among the inhabitants. I am thoroughly convinced that reconstructions, based on such tenuous evidence, should be carefully and clearly set apart from the known and indisputable facts. On page 55–56 there is a sentence which might be clarified: "Only one double burial . . . occurred, but in five cases, all but one of them . . . involving an adult and a child, the graves intersected." My question is, were "hourglass-shaped" shafts excavated for the burials; that is, are the two shafts in the "intersecting" graves contemporaneous, or is this a case of the intrusion of one grave upon another?

In the concluding section, following the description of the burials, is found a description of the skeletons themselves, their measurements and pathology. It is gratifying to find an archaeologist who has the temerity to enter the realms of physical anthropology and produce information which is of interest and

importance to all of us. Most archaeologists would do well to follow Mr. Ritchie's excellent example.

The artifacts from the site are discussed under the following headings: Bone and Antler, Rough Stone, Ground and Polished Stone, Chipped Stone, Shell and Metal, Pottery. Typologically most of these artifacts justify the inclusion of this site with the others which have helped to define the Canandaigua Focus. There are a number of types of artifacts which seem to occur in this focus occasionally but which do have relationships elsewhere. Just how the classificatory system now in vogue will accommodate itself to the presence of such "foreign" elements remains to be seen. At present it seems best simply to keep them in mind. Among the things mentioned here are a number of bone artifacts which, according to the author, are more commonly found on Iroquois sites. That the influence of the culture of these people was being felt at Canandaigua is also suggested by the "weak castellations" and "incipient collars" found on the pottery. A few types of artifacts from the Vine Valley Aspect were identified. Reworked pendants and gorgets of a type belonging to this Aspect were found on this site. They are found rarely on Owasco Aspect sites. Interestingly enough, deer scapula awls, seven of which were found at Canandaigua, turn up more commonly in the Archaic Pattern, especially at Lamoka Lake. Among the unexpected discoveries were bird-bone whistles. Formerly these were known only from prehistoric Iroquois sites and from Lamoka Lake. Two antler-celt sockets are extremely interesting rarities.

One or two things might have been done to make some of the more complicated sections of the report easier to understand. It is possible that if the actual boundaries of the areas excavated had been drawn on the map, the reader might have understood the situation a little better. One could more easily evaluate the description of the hut floors if it were known just how much of the subsoil had been exposed. Is it likely that more post-molds are to be found in the immediate vicinity of those drawn on the map, or do the two clusters represent two "units" separated from other "units" by an unproductive strip? A similar note may be made in regard to the ditches. In spite of the statements that the locations of the ditches were worked out by means of test pits, it seems to me that the map would have been clearer had the distribution of test pits been indicated upon it. As it is now, one is not sure of the amount of searching carried on, for instance, between Ditch 7 and Cemetery 2. Likewise, it is not possible to tell how far investigations were carried south of Ditch 1.

From the point of view of culture definition, this site is very satisfactory. Here, in a single, apparently unchanging deposit, all the important determinants and many of the idiosyncrasies of a single focus appear in close association. From a wider point of view, including chronological and developmental considerations, excavations in sites of this type are ungratifying. Under the present conditions it is not possible to identify fine gradations in deposits such as were uncovered at Canandaigua. Archaeologists cannot expect everything, but it is impossible to avoid hoping that eventually, when a site of this size is

discovered in what seems to be a favorable location, something will turn up which will aid in untangling the complexities of the chronological problems.

In spite of certain ponderous methods of expression which make parts of this report difficult to read, Mr. Ritchie has presented archaeology with a valuable piece of work. This review has called attention to certain unfortunate slips of the pen which partially obscure the author's interesting and really important ideas. However, the most skeptical and critical of readers cannot deny that here are published essential facts and important fancies. In providing Northeastern archaeology with a mass of good substantial information, Mr. Ritchie, following in Dr. Parker's footsteps, has taken a long stride forward.

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The Emergence of a General Folsom Pattern. EDGAR B. HOWARD. (in 25th Anniversary Studies, Philadelphia Anthropological Society, Vol. 1, pp. 111–115, Philadelphia, 1937.)

Reviewing the various Folsom discoveries with respect to the types of implements found and their faunal associations, the author points out that a general pattern is beginning to emerge from the accumulated evidence, a pattern consisting of the typology of the artifacts and their environmental background. Present knowledge shows that "Folsom man" lived in the Southwest at the same time as animals now extinct, when the climate was cooler, when streams were larger and more numerous, and when no longer existing lakes and water-holes dotted the terrain. The types of artifacts, through comparison with the chipping techniques in the Old World, are judged to be Neolithic in form, although the hunting-stage character of the Folsom complex precludes calling it Neolithic. The author leaves the future to answer the question of names or a name to define the pattern properly. He is content to call attention to the emerging pattern, and suggest that "—the time will soon be here for someone to gather together all the evidence into a comprehensive picture of the faunal and cultural sequences which reach back probably to the earlier stages of post-glacial times."

The problem of the Neolithic yet non-Neolithic aspects of the Folsom pattern, as mentioned by the author, raises a question that is becoming more important in American archaeology with each passing day; namely, that of using Old World nomenclature for New World finds. There is a marked division of opinion in the matter. Many are in favor of adopting the European terms *in toto*, while others are strongly opposed to such procedure. The question of chronology, not mere sequence, is so integral a part of the established European terminology that their use here is bound to be misleading. The present reviewer is inclined to think that some of the enthusiasm for the application of the terms

to American finds can be attributed to that very factor; that is to say, to the unwarranted implication of comparable antiquity that leaves a loophole if the age is questioned and enables the sponsor to say he merely meant the type was similar. Because an implement from a protohistoric site agrees, on the basis of typology, with a Palaeolithic form from the Old World does not justify the use of the name Palaeolithic for it here. By long established interpretation, the term has a time connotation as well as a descriptive meaning, and unless particular care is taken to make clear that only the form is referred to, misconception is bound to arise, especially in the minds of the less critical students.

For that reason avoidance of the European classification seems advisable. When the time is "here for someone to gather together all the evidence," it is hoped that the names provided for the various phases of the Folsom pattern will be distinct, and that they clarify rather than confuse the issue. Howard has taken pains in all of his work to prevent the furtherance of false ideas about the relationship between the Folsom complex and Old World cultures, and in so doing has indicated the proper procedure for others.

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Tseh So, A Small House Ruin, Chaco Canyon, New Mexico, Preliminary Report. DONALD D. BRAND, FLORENCE M. HAWLEY, FRANK C. HIBBEN, et al. (University of New Mexico Bulletin, Anthropological Series 2, No. 2, 174 pp., 23 plates, 7 figures, 4 maps, 4 tables, Albuquerque, 1937.)

This report is the result of one season's excavation in a small house mound located in Chaco Canyon, New Mexico. The excavation was carried out by a summer field session of the Department of Anthropology of the University of New Mexico in cooperation with the School of American Research. Dr. Brand, the principal author, wrote the Preface, Introduction, Part I, and the summary on Subsistence, and compiled the bibliography. Mr. Hibben wrote Part II and summaries on Vegetable Remains, on Stone and Other Artifacts, and on Mammal and Bird Remains. Dr. Hawley wrote summaries on Pottery, on Succession of Chaco Masonry Types, and on the Place of Tseh So in the Chaco Culture Pattern, and also the appendix on the Refuse Dump of Mound 50. Mr. Donovan Senter wrote two appendices; one on Floor Deposition and Erosion in Chaco Canyon, the other on Burials from mounds 50 and 51.

The first part of this report deals briefly with the method and arrangement of the summer session and then presents rather fully the history of research in the Chaco Canyon. Part I gives in detail the location of the site, the geology, weather, climate, water supply, and the natural resources of the area. This preliminary account takes up 65 pages, or slightly more than one-third of the entire report.

Part II (pages 66–84) gives a very brief summary of the site and the excava-

tions, including a short section on excavation methods. Tseh So, or Mound 50, is a Pueblo II structure of twenty-four rooms, of which four were kivas, with a second story over five or six of the rooms. This structure rests on a Pueblo I mound, and there were remains of Basket Maker III pit houses beneath that, thus presenting some very excellent stratigraphy. The Pueblo II masonry shows poorly constructed walls of single thickness composed of large sandstone blocks set in an abundance of adobe. The four small kivas were located along the east side of the pueblo. All had a bench and two had southern extensions. There were evidences of four pilasters in one of the kivas. All had fireplaces, screens, and ventilators. An unusual feature was the finding of an entire turkey skeleton in front of the ventilator shaft in each of the kivas, with two in one kiva; all were young female turkeys, with the head missing in each case. Another interesting feature was a band of incised decoration on the plaster of Kiva 3 below the bench, and also traces of painting in black and white. A single beam gave a date of 922+, a non-bark date, the cutting date being placed at 940 or 950 A.D. The Pueblo I substructure had walls formed of vertical slabs of stone set in thick adobe at the base with horizontal layers of stone and adobe above.

Part III (pages 85–119) presents summaries and conclusions on the pottery, masonry, artifacts, and the like. This pueblo was quite rich in material, but most of it has been presented in tables or graphs, thus conserving space and the reader's time. Escavada and Gallup Black-on-White were the dominant pottery types appearing in Tseh So, while Red Mesa and Escavada Black-on-White are found in greater abundance in the underlying Pueblo I structure. In the concluding section Dr. Hawley gives a brief summary of the place of Tseh So in the Chaco culture pattern.

In the first of the three appendices Mr. Senter discusses the sequence of deposition and erosion in Chaco Canyon. A trench twenty-five feet in length was carried down eighteen feet to sterile earth, and all the sherds encountered were marked as to level and classified. This survey showed that the earliest deposit was laid down sometime before the 10th century.

Appendix II deals with the burials from mounds 50 and 51, twelve coming from Tseh So and four from Mound 51. Five of these sixteen burials belonged to the Pueblo I period. Measurements and observations on five of the Pueblo II skeletons are presented in a table, although the fragmentary condition of the bones only allowed a limited number to be taken. These do, however, supplement our meager knowledge of the physical anthropology of the area. Because of the smallness of the series no comparisons or conclusions are given, although the remark is made that the lambdoid type of deformation prevailed (p. 162).

In Appendix III Dr. Hawley discusses an extensive stratigraphic test carried out in the refuse dump of Mound 50, giving a picture of the ceramic sequence from Basket Maker III through Pueblo II.

The factual material in this report is briefly presented and illustrated by both figures and plates, although a number of the latter are not as clear as

could be desired (pls. XIIb and XIIIa). An index would have greatly improved the report, and the use of Arabic rather than Roman numerals for the plates, maps, and tables would have saved space and the reader's patience. This report presents another instance of the modern tendency toward collaboration, assigning certain technical problems to those best qualified to handle them. This is a forward step for archaeological monographs, but it can be carried too far. That is, unless there is one person directly responsible for the entire report, there is apt to be a lack of cohesion between the various parts and there is greater chance for errors to creep in.

In the present report there are four authors and there are a number of instances where they evidently failed to compare notes. For example, in the use of common and scientific names for vegetable and animal remains, Brand places the common name first, followed by the scientific name in parentheses. This, I think, is the correct procedure and certainly the easiest for the reader; yet Hibben in two sections (pp. 101–111) places the scientific name first and the common second, and in Table III gives the scientific name alone. In using Tables III and IV the report has to be turned upside down; this could easily have been avoided by turning them and placing them on the opposite page. There are three sections devoted to an analysis of the pottery, one by Hibben and two by Hawley, and these show a lack of uniformity also. Hibben (p. 84) gives Red Mesa, Lino, and Kana-a neck-banded as the characteristic Pueblo I types; yet Hawley (p. 85) places the Pueblo I types in the following order: Red Mesa and Escavada Black-on-White, Lino Gray and Kana-Gray, and Exuberant Corrugated; and on page 171 gives them in the following order of abundance: Lino Gray, Red Mesa, Escavada, Exuberant Corrugated, and Gallup Black-on-White. For Pueblo II, Hibben (pp. 75, 80) gives Escavada, Exuberant, Gallup, and Red Mesa Black-on-White, and Hawley (pp. 85, 169) names all those occurring in Pueblo I plus Gallup and Chaco Black-on-White. To one not thoroughly familiar with these various types it would be rather difficult to determine the pottery complexes occurring in these periods. One might well ask: "Are Lino and Lino Gray the same? Do Kana-a neck-banded and Kana-Gray refer to the same or different types?" Exuberant Corrugated has been considered as a characteristic Pueblo II type, (Hawley, *Field Manual of Prehistoric Southwestern Pottery Types, 1936*) and yet here it is placed by Hawley in both the Pueblo I and II periods.

To the reviewer the pottery complex, as well as the masonry sequence, seems to point to a Pueblo II period throughout. That is, what is here called Pueblo I is not true or middle Pueblo I, but is either very late I or early Pueblo II. This would account for the varying amounts of the Pueblo I types, as Red Mesa Black-on-White and Kana-a neck-banded, and also for the occurrence of Escavada Black-on-White and Exuberant Corrugated, which are characteristic Pueblo II types, and the small amounts of Gallup Black-on-White, a Pueblo II–III type. Thus Tseh So itself, dating as it does about 950 A.D., appears to be a very late Pueblo II site, as shown by the presence of McElmo Black-on-

White, a late Pueblo II and early III type (Martin, *The Lowry Ruin in Southwestern Colorado*, 1936), and Chaco Black-on-White, also Pueblo III.

A regrettable feature is the use of the term "shard" throughout the report, although the term "sherd" does appear three times in Fig. 6, page 146. "Sherd" is almost invariably used by other archaeologists, and even the authors of this report have used "sherd" in place of "shard" in the other reports in this particular series and in other publications. This is most strikingly shown by Senter's section on floor deposition and erosion. This article was published in AMERICAN ANTIQUITY (July, 1937, pages 68–75), and is almost identical in context except for the substitution of the term "sherd" for "shard" as used here.

Dr. Hawley's chart of Chaco Canyon masonry types (pp. 88–89) was likewise published in AMERICAN ANTIQUITY (January, 1938, pages 250–251), with additional descriptive matter. This practice of reprinting articles cannot be too strongly condemned, particularly in these times of small budgets and accumulating material. There is at present so little space available in our journals and so many original articles in need of publication that we should confine ourselves wherever possible to a single appearance of each article.

There are one or two glaring errors and omissions that tend to mar the value of this otherwise excellent report. Dr. Hawley made the serious mistake of placing Judd's Pueblo I pit houses, dated at 777 A.D., in the Basket Maker III period. As a discussion of this error appears elsewhere in this issue (pp. 60–61), there is no need for further comment here. This error occurs on pages 85, 88–89, and 115. On the latter page Dr. Hawley says: "Douglass has dated Judd's Basket Maker III pit-houses in the Chaco at 777 A.D. Pueblo I here has not yet been dated." Such important statements should have been very carefully checked before they were allowed to get into print. It is particularly important since the same error was set forth in Hawley's article in AMERICAN ANTIQUITY.

Other instances of errors creeping in, possibly due to lack of adequate checking, may be noticed. On page 85 Hawley says: "The pottery complex from Pueblo I . . . is consistent, Red Mesa and Escavada Black-on-White, Lino Gray and Kana-Gray, and Exuberant Corrugated (Plates IIIc; XIIb; XVc,d; XVIIc,d) being the prevalent types." Yet Plate XVIIc,d, illustrates McElmo and Gallup Black-on-White, two types not mentioned in the above sentence, and Plate XIIb shows a Pueblo II burial with a number of vessels of Pueblo II pottery. On page 86 Hawley says: "In Pueblo I we find the Red Mesa Black-on-White (Plate XVb), . . . Escavada Black-on-White (Plates XIIb and XIIIa) . . . " Plate XVb is labeled Red Mesa Black-on-White from Burial 9, Room 5, yet Plate XIIIa shows Burial 9, Room 6, not Room 5 as stated above, and is called a Pueblo II burial accompanied by a McElmo bowl and an Escavada jug (Fig. 6, p. 146).

None of the pottery types, with the possible exception of Gallup and McElmo Black-on-White, Exuberant Corrugated, and Kana-a neck-banded, are at all adequately illustrated, and one of these, McElmo Black-on-White, is an

intrusive type and has been fully illustrated elsewhere. (Martin, *The Lowry Ruin in Southwestern Colorado, 1936*) There is no descriptive matter on any of these pottery types and, considering that certain of these earlier types from the Chaco have never been fully described and illustrated elsewhere, it would not have been out of place to have presented at least a brief description of each. As this is labeled a preliminary report, it is possible that the authors intend to publish a fuller summary of results at a later date. However, information as to new or little known pottery types is so vital to an understanding of the various sequences of culture that such data could very well have been set forth in this report, and certain other material, as the detailed account of the history and natural landscape of Chaco Canyon, could well have been held over for the final report. Also certain of the plates are not sufficiently well labeled to show the differences between neck-banded and true corrugated types (Pls. XVc,d; XVIc,d).

The reviewer regrets that he has had to write so critical a review of this report. This is, however, a valuable addition to our rapidly growing collection of Southwestern literature. As the extensive bibliography shows, there has been a great deal of work done in the large Pueblo III ruins in Chaco Canyon and elsewhere, but very little on the earlier Pueblo II phase. Therefore, this report will help to fill a gap in our knowledge of Southwestern prehistory.

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The Metallurgy and Technology of Gold and Platinum among the Pre-Columbian Indians. PAUL BERGSØE. (Ingeniørsvidenskabelige Skrifter, No. A 44, 45 pp., 4 pls., 2 figs. Kr. 2, Copenhagen: Danmarks Naturvidenskabelige Samfund, 1937.)

In this technical study of the minute metallic jewelry characteristic of the coast of Esmeraldas, Ecuador, Mr. Bergsøe has offered a very valuable paper, important because of certain new and surprising conclusions reached.

The well-known jewelry from this region is tiny, dainty, and evidently the product of great care and skill. Objects of various alloys of gold, platinum, and copper are found, together with small amounts of other metals which occur in the natural ore; silver occurs only in the small quantities usual in natural ore and was not used either for jewelry or an intentional alloy. The metals are secured by panning the river sands, the operation yielding not only natural metallic "dust" and small nuggets but also the tiny jewelry.

The objects are often fragmentary, seldom in pairs, and often hammered flat. This surprising and puzzling fact Bergsøe explains by the reasonable hypothesis that the metalliferous river sands hold the contents of former aboriginal cemeteries in the graves of which were buried both metallic "dust" and the jewelry fragments for metal-working. On account of the relatively large proportion of "scrap" metal and objects in process of manufacture, he believes

that the industry was not a craft, but that each man was his own jeweler. The intrinsically small amount of precious metal and the smallness and thinness of the objects indicate, in Bergsøe's opinion, that it was not plentiful. One characteristic of the jewelry is its extreme thinnesss, some of it being as thin as .04 mm. Objects and lumps of metal were found in all stages of manufacture, which fortunate occurrence aided this technical study.

Both utilitarian objects and ornaments are found. The percentage of platinum is greater in the former group in which the discoloration of the gold by the alloy is of no importance. In the gold-copper alloys the copper content sometimes runs to 50%, and the gold to 82%. The reported occurrence of objects of pure platinum is not substantiated, the highest percentage found being 57% in an alloy of gold and platinum.

The natives were apparently able to separate from the sands certain amounts of pure platinum and of nearly pure gold, leaving a residue of gold and platinum with the former preponderating, which they were unable to separate.

The technique of working platinum is especially interesting and indicates the highest skill and ingenuity. The smelting point of platinum being higher than it was possible for the natives to reach by their primitive methods, examination of objects in all stages of manufacture indicates that an alloy of platinum and gold with a preponderance of gold was secured by the sintering process. The platinum was slowly amalgamated with the gold by repeated heating and hammering. This is a new metallurgical process; platinum was unknown in Europe until two centuries ago, and for the next century it was unworkable.

In his deductions under the caption of "Civilization and Culture," Bergsøe attempts to reconstruct the evolution of metallurgy in the region. His conclusions are logical hypotheses, and presented as such, but unconvincing to archaeologists who will look for future stratigraphical or comparative evidence to support or disprove them. He admits that his premise that the technical development was always progressive and that no violent retrogressive upheavals occurred is by no means a safe assumption, but, granting the premise, he sees four periods of development, based on technology, the only possible criterion in this case. At first the natives used mixtures of gold and platinum dust and alloyed it with copper; objects of this alloy tend to be heavier, larger, ruder, and unwelded. (The fact that some "extremely crudely worked finger-rings," a type of object extremely uncharacteristic of pre-Columbian America, fall into this group, and that other finger-rings found show by their decorative motives Spanish influence, is an argument against this deduction.) In the second period the copper and platinum content are less and the objects thinner and better made. In the third period welding came to be employed and ornamentation became more elaborate. In the last period welding became common, wire filigree work was made, gold and platinum plating perfected, and many new types of objects made.

The absence of any gold casting in this region is a surprising fact that may have some bearing on the question of the chronology of the region and the de-

velopment of metallurgy in primitive America. The occurrence of several finger-rings showing Spanish influence in the collection indicates that the industry was in effect at the time of the Spanish Conquest. Yet elsewhere, in Mexico, Colombia, and Peru, contemporary reports indicate that the cire perdue method of casting was the most important metallurgical process at that time.

The format and typography of the monograph are excellent; the English translation and orthography very good, but not impeccable.

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The chief technical conclusions reached by Mr. Bergsøe may be summarized briefly as follows.

1. Some of the gold has been alloyed with copper.

2. The gold-copper alloy was smelted on charcoal, probably with a blowpipe, and worked by heating and hammering.

3. A platinum-gold-silver alloy, of which the silver component was present in small quantities in the gold ore, was produced by sintering and worked by alternate forging and heating.

4. Most of the platinum alloy was used to plate gold by a process of hammering and annealing.

5. None of the gold objects was cast.

6. The fragments of wire which are found in abundance were drawn from forged bars and smoothed by milling between polished stone.

7. Compound objects were joined by welding; soldering was not employed. Both autogen and ordinary welding methods were used.

8. Cold-hammering of platinum-rich alloys produced metal harder than the best bronze, "the very hardest metal ever found in America from the pre-Columbian period."

Mr. Bergsøe's results were not obtained entirely by analytical methods Although twenty-two chemical analyses are reported which reveal the composi tion of the gold-copper and platinum-gold-silver alloys, and reference is made to spectroscopic analyses which demonstrated the absence of the use of soldering metals such as tin and lead, much of the work consisted in a megascopic examination of unfinished objects. Discovery of a lump of copper coated with gold, but not yet alloyed, reinforced the chemical evidence of an artificially produced alloy of these metals. Similarly, lumps of platinum were found in what are evidently various stages of sintering with gold. Synthetic experiments were carried out in certain instances. To show that the hardness of objects composed of the two chief alloys is due to cold-hammering, synthetic test-pieces of similar composition were prepared, treated by cold-hammering and by annealing, and the hardness produced by each process determined.

The author relies frequently on theoretical considerations, analogy with modern metallurgical practice, and negative evidence. Thus the high smelting point of platinum is taken as evidence that the platinum alloy could not have

been smelted by any means which the Indians may be supposed to have had at their disposal; but since the proportions of gold, platinum, and silver shown by chemical analysis are those of a combination of metals which is rare or unknown in nature, the alloy must have been made artificially by some other method. In the case of the gold-copper alloy the author contends that the absence of the characteristic "tail" which is usually formed when metal is poured into a mold justifies the assumption that casting was not practiced.

These several methods of dealing with metallurgical problems are used with proper restraint and caution. It is evident that Mr. Bergsøe's inferences are based on a profound knowledge of metallurgy. Nevertheless, there is no denying that many of the results are obtained by the convergence of lines of indirect evidence.

The reviewer feels that for this reason the study cannot be regarded as final. At least two direct technical methods, which our author has not employed, are available for this type of research, i.e., the use of the metallographic microscope and etching tests. Under ordinary conditions these techniques will reveal the intimate crystalline structure of a metal and show whether it was forged or cast, hot or cold worked, drawn or milled. It is true that in this case, since the objects are of relatively great antiquity, recrystallization may have destroyed the original textures and metallographic study might therefore be pointless. Yet in view of the importance of the conclusions stated by Bergsøe, one feels that every simple direct analytical method should be tried in an effort to give a conclusive demonstration if such demonstration is possible.

The importance of a metallographic study will perhaps be more evident in the light of comments on Bergsøe's work made by Dr. E. M. Wise, Assistant Manager of the Bayonne Research Laboratory of the International Nickel Company. I quote a few pertinent sentences from a letter received from Dr. Wise: "... I have discussed certain aspects with friends who are familiar with the platinum currently derived from alluvial Choco deposits ... it is observed that this platinum exists in two rather distinct forms, one an angular shiny form which appears not to be ductile and another which is irregular in shape and which shows considerable deformation in situations where it has been tumbled among the gravels of the river bed. Both types contain about 85% platinum metals.

"It would seem probable that samples of the ductile variety of sufficient size could be hammered into shape without any special treatment. It would seem reasonable to suppose that the Indians would use ductile masses of native platinum where possible, but would resort to bonding of small ductile grains when larger masses of workable material were not at hand."

As long as there is this possibility, suggested by Dr. Wise, that some at least, of the platinum objects were made by hammering ductile platinum, the conclusion that all the platinum alloy was sintered requires further confirmation.

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